NETWORK WORLD
The Newsweekly of User Networking Strategies
Volume 7, Number 46 An International Data Group Publication November 12, 1990

AT&T offers new service control tool

By Bob Wallace
Senior Editor

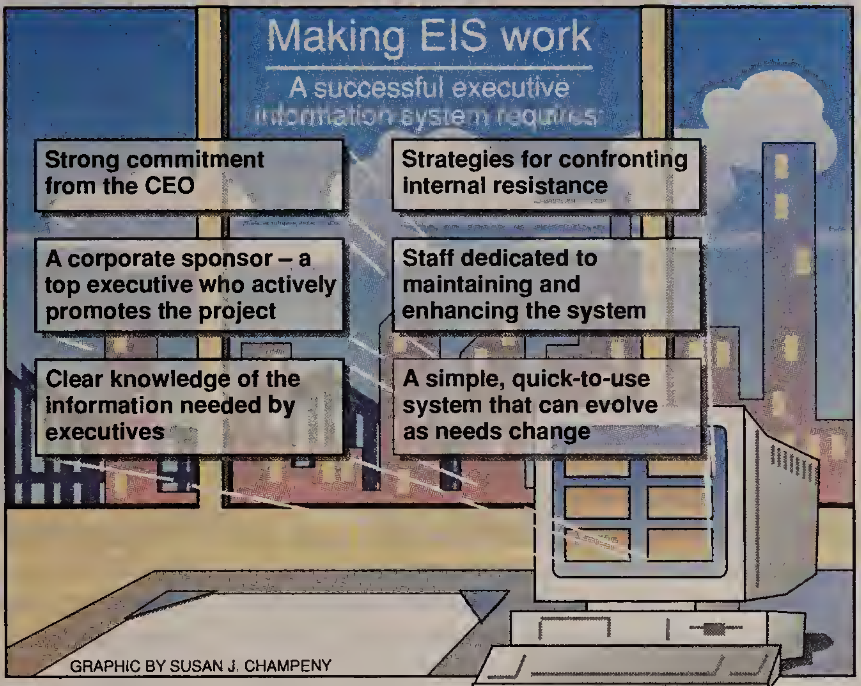
BASKING RIDGE, N.J. — AT&T last week introduced a service that makes it easier for users to manage digital private-line networks, as well as a service that enables users to reserve 45M bit/sec T-3 circuits on an as-needed basis.

AT&T's Accunet Bandwidth Manager (ABM) enables customers using an on-site personal computer to order, reconfigure, reroute and report problems with digital private lines. It works with AT&T's Accunet Spectrum of Digital Services, as well as Accunet T1.5 and Accunet T45 services.

ABM offers more features and incorporates more services than its predecessor, AT&T's Customer Controlled Reconfiguration (CCR), which ABM will likely replace. ABM will complement AT&T's high-end Bandwidth Management Service (BMS) and will be available in 50 cities by mid-1991, the carrier said.

ABM customers use an MS-DOS-based personal computer running Microsoft Corp.'s Microsoft Windows 3.0 and AT&T software to access an ABM controller — a Sun Microsystems, Inc. SunServer 490 — in a central carrier facility via a 9.6K bit/sec dial-up

(continued on page 73)


Making EIS work
A successful executive information system requires:
Strong commitment from the CEO
Strategies for confronting internal resistance
A corporate sponsor – a top executive who actively promotes the project
Staff dedicated to maintaining and enhancing the system
Clear knowledge of the information needed by executives
A simple, quick-to-use system that can evolve as needs change

GRAPHIC BY SUSAN J. CHAMPENY

Politics, technology woes hinder the success of EIS

Executive info systems fail to live up to promise.

By Wayne Eckerson
Senior Editor

CAMBRIDGE, Mass. — While executive information systems (EIS) have great potential to empower executives and enhance decision making, many systems have failed to live up to their advanced billing and are gathering dust in executives' offices.

The systems are designed to provide top executives with customized communications and decision support capabilities, including electronic mail and on-line access to information services, as well as summary information pooled from data bases across a network.

But many users flounder in building EISs because they fail to garner support and cooperation from top executives. Others underestimate the resistance to such systems from mid-level managers who fear senior executives will meddle in operations or second-guess their decisions.

Still others run into technological problems, finding they simply can't deliver the information executives want, either because it doesn't exist or can't easily be collected and reconciled, said users and consultants at a

(continued on page 77)

BBN reveals plans for cell relay switch

Vendor to unwrap high-end X.25 switch supporting frame relay; preps cell relay switch for 1992 debut.

By Paul Desmond
Senior Editor

CAMBRIDGE, Mass. — BBN Communications Corp. today will announce a new X.25 packet switch supporting frame relay and is working on a high-speed cell relay switch, the company told *Network World*.

BBN Communications' new T/300 Packet Switching Node supports speeds from 9.6K to T-1.

The cell relay switch will be scalable from T-1 to potentially gigabit speeds and will position the company to meet emerging user demand for transmission systems supporting high-bandwidth applications such as imaging and local-area network bridging.

Cell relay, or cell switching as BBN Communications calls it, promises to support high-bandwidth applications — particularly applications characterized by bursty data traffic — by utilizing bandwidth more efficiently. Rather than dedicating a fixed amount of backbone bandwidth between two end points, as in circuit switching, cell relay gives a single application access to the full backbone capacity as needed.

BBN Communications said its cell relay switch will take advantage of the busless butterfly architecture developed by the BBN Advanced Computer division for the company's TC/2000 high-speed parallel computer.

Other vendors, including T-1 multiplexer vendors and carrier equipment makers, have pledged

(continued on page 78)

INSIDE

Source routing traffic jams, page 42.

Users share insights into groupware

By Tom Smith
Senior Writer

Early groupware users say the software can dramatically improve productivity, but they cautioned potential users that implementing the local-area network-based products can be a technical challenge.

As the name implies, groupware products are client/server applications that enable groups of end users to interact more effectively. They support a variety of capabilities, including messaging, document sharing and scheduling tools.

Users of Lotus Development Corp.'s Notes and AT&T's Rhapsody Business Orchestration Solution, two prominent groupware products, lauded the offerings for

(continued on page 78)

NETLINE

▲▲▲

IBM, NYNEX, NTI team up to test software linking CO switches to customers' computers. Page 2.

TIGHTER TRAVEL BUDGETS and rising costs boost usage of videoconferencing and other network tools. Page 2.

MCI PROVIDES HIGH-SPEED access to the supercomputing center at the University of California, San Diego. Page 2.

MCI AND BRITISH TELECOM map out their plans for a high-capacity transatlantic fiber cable. Page 4.

INTEL UNLEASHES a chipset that supports multimedia applications on PCs. Page 4.

HACKERS commandeer a user's voice mail system. Page 6.

NEWSPAPER

FEATURE

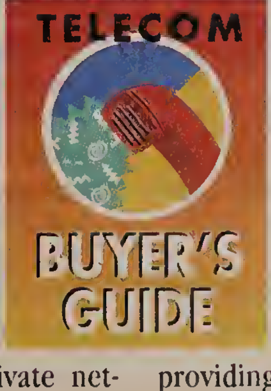
▲▲▲

MANs provide digital services at low cost

By Daniel Briere
Contributing Editor

While most carrier data service offerings are being promoted loudly and often, metropolitan-area networks have been strangely quiet.

Strangely, because they offer a lot: savings, bandwidth, low error rates and high availability. Metropolitan networks once were mainly dedicated private networks. Today, they include dedicated and switched lines, and they are sold by both alternative access carriers and local exchange carriers.



Their most popular applications include providing access to domestic or international long-distance carriers, interconnection of local-area networks, access to remote data centers, building private nets and providing channels for al-

(continued on page 51)

Vendor troika teams in CO switch-to-computer trial

IBM, Northern Tel and Nynex to test software that passes call data from CO switch to user's host.

By Anita Taff
Washington Bureau Chief

NEW YORK — IBM, Northern Telecom, Inc. and Nynex Corp. last week said they will test new software that allows central office switches to pass call information, such as automatic number identification (ANI), to computers at customer locations.

The new technology will allow Centrex users to utilize call management applications that until now have been available only to private branch exchange users.

Because the capability is supported from the central office, users will be able to support personnel throughout a carrier's local serving area. A company could, for example, have voice calls as well as customer files passed to an employee using a workstation at home.

Syracuse University in Syracuse, N.Y., will be the first user of the technology in a trial scheduled to begin next year. The school, which has 9,000 Centrex lines installed, will test an application that provides campus operators with screens of data that help them respond to emergency calls. In the test, an on-site IBM Application System/400 minicomputer will receive ANI from a Northern Telecom DMS-100 central office switch.

The university hopes to trim

(continued on page 75)

Users turn to net services as means to reduce travel

Firms promote videoconferencing, E-mail options.

By Bob Brown
Senior Editor

The deteriorating economy is putting the squeeze on corporate travel budgets, forcing more companies to consider videoconferencing, electronic messaging and other alternatives to travel, users said last week.

The specter of an impending recession, in addition to skyrocketing airline fares, has some companies looking to their network departments to supply users with services to communicate with customers and suppliers in lieu of travel.

"We've become much more cost conscious when it comes to travel of late," said a spokesman for GTE Telephone Operations, a subsidiary of GTE Corp. "Our management is encouraging employees to take better advantage of videoconferencing, teleconferencing and the other resources we have."

Michael Prince, data processing manager for Burlington Coat Factory Warehouse Corp., said he already needs more justification to travel than his average peer and relies on electronic messaging and other telecommunications facilities as an alternative to travel. "But I would bet there is even more pressure to minimize

(continued on page 74)

University signs with MCI for high-speed fiber link

By Bob Brown
Senior Editor

SAN DIEGO — The University of California at San Diego (UCSD) last week announced a five-year, multimillion dollar agreement with MCI Communications Corp. to link its facilities to MCI's network via a high-speed fiber-optic link.

The 405M bit/sec fiber link will bypass the local loop between the university and an MCI point of presence here, providing at least 20% in savings on voice and data costs to UCSD.

The link will also provide better access to the San Diego Supercomputer Center, which is located on the UCSD campus, for thousands of researchers on the National Science Foundation Network (NSFNET).

The new fiber link, consisting of nine T-3s, provides capacity that is comparable to that required to serve a major urban area and is designed to meet the voice, data, video and other network needs of UCSD until the turn of the century.

The university is expected to use only a portion of the full fiber network capacity initially and add bandwidth over time, an MCI spokesman said.

The fiber network is expected to be operational by year end, the spokesman added.

(continued on page 74)

Briefs

John Hancock signs up for Tariff 12. AT&T last week said it will provide John Hancock Financial Services of Boston with voice and data services for 660 sites nationwide under a Tariff 12 deal signed in September.

The three-year $30 million contract covers inbound and outbound voice and data communications services. The Tariff 12 deal was signed prior to a federal appeals court ruling last month that overturned the Federal Communications Commission's April 1989 decision allowing AT&T to offer custom networks through Tariff 12. The court ordered the FCC to reexamine the legality of the deals.

John Hancock recently completed a cutover from WATS services to a nationwide AT&T Software-Defined Network and had been negotiating the Tariff 12 option for many months.

Feds form open systems council. The National Institute of Standards and Technology (NIST) and the Office of Management and Budget are spearheading the formation of the Federal Open Systems Users Council, which will pass open systems requirements from users to vendors.

The council, which will hold its first meeting Nov. 19 at NIST headquarters in Gaithersburg, Md., expects to influence vendors' open systems directions for computer and communications products. The group will also lobby for certain standards.

Carriers say ISDN is on tap. Representatives from three telephone company units at the National Centrex Users Group conference in San Diego last week outlined plans to introduce new Integrated Services Digital Network features and tariffs.

Phil Skeba, director of switched services for Ameritech Services, Inc. in Schaumberg, Ill., said Ameritech will file an ISDN Primary Rate Interface (PRI) tariff in the first quarter of 1991 and is studying privacy issues related to caller ID service, which delivers a caller's main telephone billing number to the called party. Skeba said Ameritech expects to roll out caller ID next year but declined to say if or how it would offer blocking.

Scott Corey, a director with The Chesapeake & Potomac Telephone Co. of Maryland, said by year end, Bell Atlantic Corp. will file a tariff to offer ISDN Centrex Basic Rate Interface (BRI) service throughout its region, followed by a single line BRI offering in the second quarter of 1991 and an ISDN PRI tariff in the third quarter.

Bill Hickam, CentraNet group product manager for GTE Corp., said his firm is close to merging its offerings with Contel Corp.'s to form a single national Centrex product line. This effort will reduce GTE's costs by 50%, a savings that will be passed on to users in the form of lower rates.

Caterpillar sets VSAT first. Caterpillar, Inc. last week conducted the first VSAT-to-VSAT international broadcast video transmission between the U.S. and Europe using technology developed by AT&T and Regie des Telegraphes et des Telephones (RTT), Belgium's telecommunications authority.

The telecasts linked Caterpillar's headquarters in Peoria, Ill., via very small aperture terminal links to its Gosselies, Belgium, manufacturing facility. Caterpillar is using the video broadcast to share product demonstrations with dealers in Africa and Europe from its plant in Gosselies.

Marriage made on Wall Street. AT&T and NCR Corp. are discussing the possibility of combining their computer businesses, according to a report published last week in the *The Wall Street Journal*. Both companies declined comment, citing their corporate policy against speculating on possible acquisitions. According to the *Journal*, AT&T would possibly acquire NCR or sell off its computer business to NCR and take an equity stake in the combined business.

FCC OKs Pacific cable ventures. The Federal Communications Commission last week said it has approved applications for three new undersea cable systems — Haw-5 from California to Hawaii, PacRimEast from Hawaii to New Zealand, and PacRimWest from Australia to Guam — to be built by a consortium of telephone companies.

The three systems, estimated to cost $760 billion, will be jointly owned by AT&T, GTE Corp., MCI Communications Corp., Overseas Telecommunications, Inc., TRT/FTC Communications Corp., US Sprint Communications Co. and World Communications, Inc., as well as 20 foreign telecommunications administrations. Haw-5 and PacRimEast are expected to be operational in early 1993, while PacRimWest will be cut over in late 1994.

CONTENTS

Industry Update

OSI forum focuses on interoperability. **9**
NATA exec says U.S. gov't may stifle CPE competition. **9**

Telecommunications

NTI server widens SCD service options. **11**
Study say regulators holding line on rate hikes. **11**

Data Communications

Adaptive switch gets a mixed reception. **17**
CCITT approves standards for modems. **17**

Local Networking

Proposed groups eye alternate FDDI media. **21**

Management Strategies

Net exec details ups, downs of Chapter 11. **27**
Study claims demands on IS execs create gap. **27**

International

INTELSAT reforms to ease competition. **33**
Group pushes for unified toll-free numbering plan. **33**

Products & Services

Intergraph ushers in CAD conferencing era. **37**
Republic Telcom boosts voice/data multiplexer line. **37**

Opinions

Court opinion: mortal blow or superficial wound? **38**
Recession: good news or bad news for networking? **39**
Action Center **62**
Networking Marketplace **67**
Networking Careers **67**
Resource Directory **68**

NW Bulletin Board Contact us electronically. Our BBS lets you submit letters to the editor, pass on tips and leave change of address requests. It is also a forum for interaction with other readers.

Use your IBM, Apple or other microcomputer to reach the BBS at 300 to 2,400 bit/sec (8N1) by dialing 508-620-1160, or 508-620-1175, or at speeds up to 9.6K bit/sec by dialing 508-620-1178. You can also reach us in person by calling 800-622-1108.

Article reprints (minimum 500 copies) can be obtained from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9171; (508) 875-6400.

There's only one PBX system that won't be blown away by the future.

When the future comes knocking, only one PBX has both the flexible architecture and power to answer the challenge. The Fujitsu F9600.™ Unlike others who've retrofitted older PBXs, the F9600 was designed from the start to take advantage of emerging telecommunication services—like ISDN and broadband. For starters, its distributed processor architecture lets you add capacity and functionality simply by adding processor modules. Its single stage switching matrix provides smooth growth and fast processing of voice, data and, when you need it, broadband services such as video. And thanks to its high-level applications-oriented software, new applications can be added as quickly as your needs change. Today, the system is performing worldwide in over 1,300 installations. Which shouldn't come as a surprise, considering Fujitsu Ltd. is a pioneer in ISDN technology and an $18 billion global leader in computers and telecommunications. To see just how much better the F9600 really is, call Fujitsu Business Communication Systems at 1-800-654-0715. You'll find that with the F9600, the future's nothing to be afraid of.

FUJITSU

FUJITSU BUSINESS
COMMUNICATION SYSTEMS

© 1989, Fujitsu Business Communication Systems. F9600 is a trademark of Fujitsu Business Communication Systems.

See The FAXNeT Form on Page 55

Telecon X features latest in videoconferencing gear

Four Japanese firms set tone by demonstrating prototypes based on emerging Px64 standards.

By Barton Crockett
Senior Editor

SAN JOSE, Calif. — Attendees at last week's Telecon X show here caught a glimpse of the future as vendors rolled out new standards-based videoconferencing products that could eventually reshape the market.

Four leading vendors from Japan have set the pace for standards-based videoconferencing by introducing new or prototype videoconferencing systems based on emerging Px64 standards. Until now, these firms had only dabbled in the market via reseller deals with U.S. companies.

The introductions by Mitsubishi Electronics Corp., NEC Corp., Oki Electric Industry Company, Ltd. and Videocom International Corp. — a unit of the Japanese carrier Kokusai Denshin Denwa, Ltd. — represent one of the largest single displays of commercial Px64 technology.

The standard is only now being finalized and vendors have not yet rolled out many commercial Px64 systems.

Px64 is the working name given to a series of standards for transmitting video and audio signals between coder/decoders (codec) at speeds ranging from 64K to 2.048M bit/sec. Unlike current proprietary codecs, those that support Px64 will be able to interoperate with other vendors' codecs based on the same standard. The first version of Px64 is expected to be formally approved by the Consultative Committee on International Telephony and Telegraphy in December.

Some analysts predict Px64 could eventually cause the videoconferencing industry to undergo the same revolution the facsimile market underwent when CCITT Group III standards caused proliferation in the use of facsimile machines.

"The fax metaphor is very good — in fact, [Px64] could be even bigger than that," said Roger Redmond, vice-president at the investment firm Piper, Jaffray & Hopwood in Minneapolis.

After new and improved versions of Px64 standards come out in 1992 and are implemented by vendors, Redmond said sales of videoconferencing equipment could soar above $500 million per year, compared to about $120 million per year now.

New products

Of the five vendors showing Px64 products at Telecon X, only Mitsubishi, NEC, Oki and Videocom demonstrated Px64 products never before introduced in the U.S.

Mitsubishi demonstrated a prototype Px64 codec, and said it will use the technology in a videophone and a commercial codec which it will roll out next year.

Videophones, also called picturephones, are expected to be the cornerstone of a consumer market for videoconferencing by making it possible for consumers to buy low-cost devices that display callers' images.

Videophones typically are expected to operate over switched 56K or 64K bit/sec lines and compress full-motion video for display on small screens adjacent to telephones.

Pricing to come down

While the videophones on display here were listed at prices around $20,000, the devices are expected to cost between $500 and $1,000 by the end of the decade, observers said.

Oki announced its OKI T.V. Rollabout Conferencing System, a $55,000 videoconferencing system that includes a monitor, codec and camera. The system is expected to ship in the first half of 1991. The company also unveiled its Oki Videophone, which provides full-motion video images along with a voice call. It will cost roughly $25,000 and is scheduled to ship next year.

Videocom announced its Videophone, based on the Px64 standard, that will cost under $20,000 and is expected to ship in the first quarter.

NEC rolled out its NEC Visual Link 5000, a Px64 codec that supports NEC proprietary algorithms and Px64 technology. That product is scheduled to ship in March at a price of $44,000.

Leading U.S. videoconferencing vendors Compression Labs, Inc. and PictureTel Corp. said they do not plan to support Px64 standards until next year and did not display any Px64 technology at the show.

Intel chipset will support full-motion video on LANs

By Barton Crockett
Senior Editor

PRINCETON, N.J. — Intel Corp. last week announced a new chipset that will enable users to support multimedia applications, including full-motion video, on local-area network-attached personal computers.

The introduction of the B series i750 Video Processor chipset will enable computer vendors and add-on board makers to develop video processing boards capable of sending compressed full-motion video over LANs. Such a capability would help usher in an era of LAN-based multimedia applications, industry analysts said.

At $89, the B series i750 chipset represents an increase in performance and a decrease in price over its A series predecessor.

According to Rick Stauffer, marketing manager for Intel's Princeton Operation here, which makes the i750 chipsets, the A Series chip was embedded on a board and sold as a prototype development tool for $2,000 to $2,500. By contrast, the new B series is available on boards costing as little as $1,000.

A number of vendors are expected to use the technology in their products, including IBM, which is committed to using i750 chipsets in its computers, a company spokesman said.

PictureTel Corp. will also use a third-generation of the i750 chipsets, due out in 1992, in its video coder/decoders, according to Normam Gaut, chairman and chief executive officer of the Peabody, Mass., videoconferencing vendor. The new B series chipset is scheduled to ship in the third quarter of 1991.

Full-motion video

From a networking standpoint, one of the most significant facets of the i750 chips is that they can be used to let personal computers compress analog video signals into digital video signals. These signals can then be transmitted over local nets or T-1 links at rates between 1.2M and 1.5M bit/sec.

Such a capability could be used to let travel agents access full-motion videotapes of resorts via LANs from a remote video library or even to let users conduct interactive videoconferences via personal computers attached to LANs or T-1 links.

Currently, it is virtually impossible for personal computers to compress and decompress analog video signals for transmission over T-1 or LAN links because of a dearth of cost-effective video compression capabilities in personal computers and a lack of LAN-based video communications software.

Analog video signals consume too much bandwidth to be communicated over LANs or T-1 links without compression.

Some analysts said the ability to send full-motion video from personal computers over LANs or wide-area networks will bring the dream of true multimedia computing much closer to reality.

(continued on page 78)

MCI, British Telecom join in Atlantic fiber project

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — MCI Communications Corp. and British Telecommunications PLC last week announced plans to jointly construct a transatlantic fiber-optic cable, dubbed TAT-X, to satisfy the growing demand for international capacity.

The TAT-X cable system, which will handle as many as 150,000 simultaneous telephone calls per fiber pair at transmission rates as high as 2.4G bit/sec, will be the highest capacity transatlantic cable ever deployed. Completion is expected by 1993 at an anticipated cost of $400 million to $500 million. TAT-X will be the 10th transatlantic cable system.

The TAT-X project, which was applauded by MCI customers, marks the first time MCI has taken the lead in an international consortium for undersea cable construction.

"Both companies saw the growing demand for cable capacity between Western Europe and America," said MCI Executive Vice-President Eugene Eidenberg. He said by 1993, TAT-X will be needed because current undersea cable capacity is insufficient to meet the anticipated demand for service that will result from rapid growth in global networks.

(continued on page 72)

General DataComm set to resell Alcatel SONET switch

Also plans cell, frame relay support on muxes.

By Paul Desmond
Senior Editor

MIDDLEBURY, Conn. — General DataComm, Inc. last week announced an OEM agreement under which it will resell a line of SONET switches and laid out plans to support cell relay and frame relay switching on its own T-1 multiplexers.

General DataComm will resell Alcatel Network Systems' Synchronous Optical Network (SONET) switches and work to support the switches under the network management system used to control General DataComm's own Megamux TMS T-1 multiplexers. The firm is also working with Alcatel to give the SONET switches the intelligence to automatically bypass failed nodes or links.

The Alcatel switches are for use in either drop-and-insert or point-to-point configurations. They support speeds between 51.84M and 622.08M bit/sec.

General DataComm said it is also working on a new TMS Packet Processor (TPP) module that will enable its Megamux T-1 multiplexers to support frame relay.

The interface will be complemented by enhancements to the switch's bus architecture that will allow it to support both circuit and packet switching, a strategy adopted by Netrix Corp.

(continued on page 76)

NCUG meeting portends affordable CO-based ACD

Carriers reveal plans to offer central office automatic call distributor services next year.

By Bob Wallace
Senior Editor

SAN DIEGO — Last week's National Centrex Users Group (NCUG) conference here was a watershed event in users' quest for affordable and ubiquitous central office-based automatic call distributor (ACD) services, attendees said.

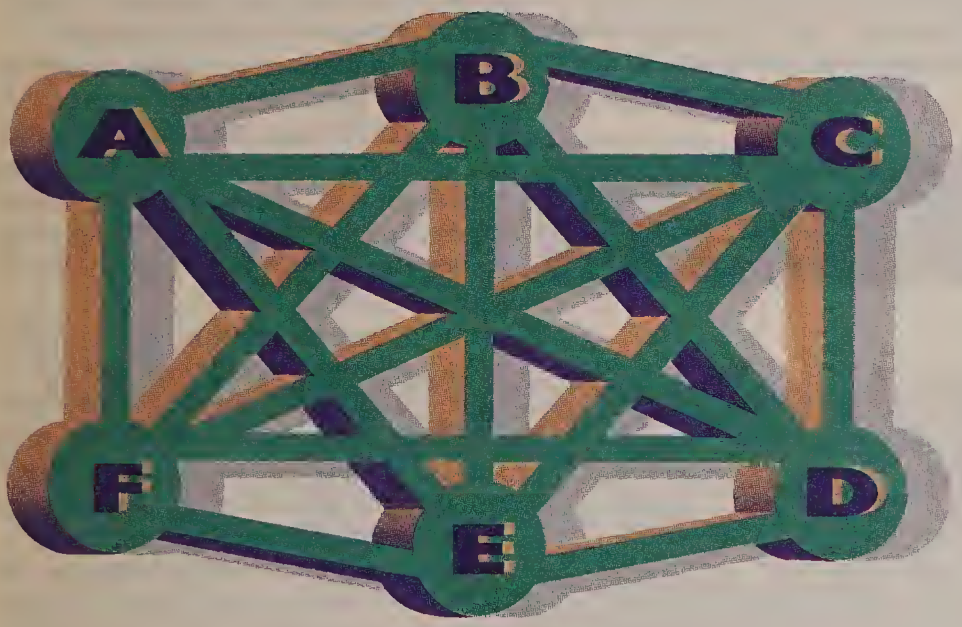
At the conference, several carriers detailed plans to offer ACD services, which are becoming a high priority for Centrex users. US West, Inc. said it plans to install new Northern Telecom, Inc. central office equipment that will enable the regional Bell holding company to offer a single, switch-independent ACD service to users in five major cities in the first quarter of 1991 (see "NTI server widens ACD service options," page 11).

The Chesapeake and Potomac (C&P) Telephone Co. of Maryland, GTE Telephone Operations and Southwestern Bell Telephone Co. also pledged to unveil or expand ACD services.

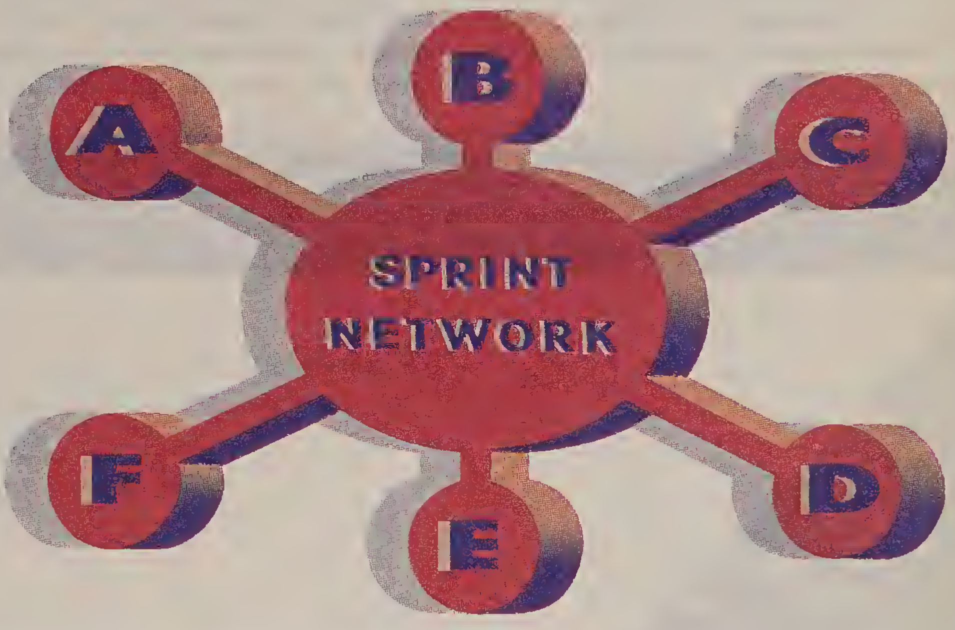
Users applauded the announcements but warned that the services must be made available quickly and priced attractively if carriers want to keep Centrex customers from buying ACD products from other vendors.

(continued on page 75)

Traditional LAN Internetwork



SprintNet LAN Reach X.25



THESE LANS ARE THEIR LANS.

THESE LANS ARE OUR LANS.

UP TILL NOW, the conventional way to build a LAN internetwork was to use private lines. And to connect each LAN to every other LAN or host. The management issues were a nightmare. And the costs were even worse. Which is why most people only connected a few of their LANs. Or none at all.

But now there's a simple, cost-effective solution. Sprint LAN Reach℠ X.25. To begin with, each LAN has only one point of connection. From that one point, any user on any LAN can talk simultaneously to any other user. And have full connectivity to mainframes, minis, databases and X.400 e-mail services. In a wide range of computing environments, including IBM.®

With Sprint LAN Reach X.25, you get a meshed network without the cost of redundant lines. And you get comprehensive management of LAN interfaces, communication lines, and modems. As a result, you'll have lower management overhead. You also get the inherent reliability that our automatic rerouting offers.

When you work with US Sprint,® you get a lot more help than you'll find anywhere else. Because SprintNet℠ is the largest public data network in the world. (In the past, we were known as Telenet.®) And we have the resources to give you a single-vendor source for design, implementation, and management of end-to-end network solutions.

As an extra advantage, there's even a free installation offer.

And LAN Reach X.25 is just one of our family of LAN services. Soon, our LAN Reach℠ 56 will be available. So you can enjoy all the benefits Sprint offers on our switched high-speed network.

If you'd like to see exactly how LAN Reach X.25 fits into your specific environment, call 1-800-735-3299.

In just a few minutes you'll have a complete package of information in your fax machine.

And we'll show you the best possible way to build an enterprise-wide network.

With a lot less lines. And a lot more help.

US Sprint.
IT'S A NEW WORLD℠

© 1990 US Sprint Communications Company Limited Partnership. ® IBM is a registered trademark of IBM Corporation.

Police arrest teens for wreaking havoc on publisher's voice mail

By Maureen Molloy
Staff Writer

PETERBOROUGH, N.H. — Two teenage hackers were arrested last week for allegedly commandeering the voice mail system of *Network World's* parent company, International Data Group, causing more than $2 million in damages.

According to authorities, the teens illegally accessed the voice mail system at IDG's Peterborough publishing complex on several hundred occasions during a five-month period.

Olga Greenwood, IDG's corporate telecommunications analyst, said the youths took over employees' electronic mailboxes, changed passwords and greetings, left harassing messages and destroyed valuable information.

The duo, 14- and 17-year-old brothers who first broke into the system last May, were arrested at their home in New York. According to New York State Police Senior Investigator Donald Delaney, the boys admitted to tampering with the system because they were annoyed that *Gamepro*, an IDG publication, had failed to send a poster promised with their subscription.

Delaney said the teens were charged with computer tampering, unauthorized use of a computer and aggravated harassment. The 17-year-old will be charged as an adult and the 14-year-old as a juvenile, he said.

Delaney said the boys have not detailed how they broke into the system but added that several books on computer hacking were found at their home.

Employees in the company's advertising, editorial and circulation departments began complaining in May that their phone mail passwords were invalidated and incoming messages were not being saved. Numerous tests were performed to deter-

(continued on page 76)

ANSI takes new tack with frame relay standard

By Paul Desmond
Senior Editor

BOCA RATON, Fla. — Members of the ANSI subcommittee working on frame relay protocols said last week a standard is close to adoption, but they warned that it differs from a recently announced specification supported by over 20 vendors.

The variations mean products that support the Local Management Interface (LMI) specification proposed in September will not be fully compatible with those built to the ANSI standard as it now exists. But vendors could support both standards on their equipment and let users choose between them.

At a recent meeting here, ANSI's T1S1.2 subcommittee decided to adopt capabilities spelled out in the LMI specification as options in the ANSI frame relay standard as it relates to permanent virtual circuits. The T1S1.2 group is working to define frame relay access protocols.

The functions include the ability for one device to notify another when a permanent virtual circuit has failed and to request the status of a circuit. There is also a connectivity verification function that enables a device to signal that it is still active even when no data is passing through it.

"In practical terms, this means we now have a set of usable frame relay standards," said Steve Silverman, chairman of the T1S1.2 working group and a member of the technical staff at Mitre Corp. in McLean, Va.

(continued on page 73)

IBM joins effort for FDDI LAN interoperability

By Bob Brown
Senior Editor

SUNNYVALE, Calif. — IBM last week joined the Advanced Networking Test Center (ANTC), a vendor consortium formed to ensure the interoperability of FDDI local-area network products.

IBM's induction as a charter member of ANTC boosts the organization's credibility and could spur other vendors to join the group, industry observers said.

ANTC, which operates a test center at a new $750,000 facility on chip maker Advanced Micro Devices, Inc.'s (AMD) campus here, is dedicated to testing and certifying the interoperability of Fiber Distributed Data Interface products. Existing members include AMD, cisco Systems, Inc., SynOptics Communications, Inc., Timeplex, Inc. and about 20 other companies.

"One of the concerns [users] have is 'How can I be sure your FDDI products will work with other vendors' FDDI products?' " said John Baltz, manager of future LAN programs at IBM in Research Triangle Park, N.C.

By joining ANTC, IBM will ensure inter-

(continued on page 72)

DIGITAL•SWITCHING•AND•NETWORK•PRODUCTS

An ideal relationship is one that is mutually rewarding.

At Mitel, we understand that you rely on us to take care of the tools of communication, so you can concentrate on using them.

AN IDEAL RELATIONSHIP BENEFITS BOTH PARTIES.

It's a philosophy that has won us the highest overall customer satisfaction rating in North America.

It's good business for us. Good business for you.

MITEL™

For more information call
1-800-MITEL SX

"At St. Jude, we're caring for children with cancer. We need a network that can care for itself."

"Only BANYAN could have done it."

From an interview with Albert Herrington,
St. Jude Children's Research Hospital.

"We don't want a big network administration staff. We're a research hospital dedicated to catastrophic childhood diseases, and that's where the money goes."

What problems did you face?

"The worst problem was the conglomeration of hardware to be tied together. Everything from PC ATs to DEC VAXs and an IBM AS/400. That, and continuous moves as we remodel and expand the facilities."

Whose network operating software did you evaluate?

"Everyone's, it seems. IBM's, AT&T's, Novell's, Banyan's and 3Com's."

How does St. Jude feel about choosing Banyan's VINES® now?

"We're extremely pleased. VINES' StreetTalk® feature has made moving people easier because you can reach them anywhere, anytime on the network without having to know their specific server. And since VINES is so reliable, we can concentrate more time on application development and helping our users take full advantage of the network."

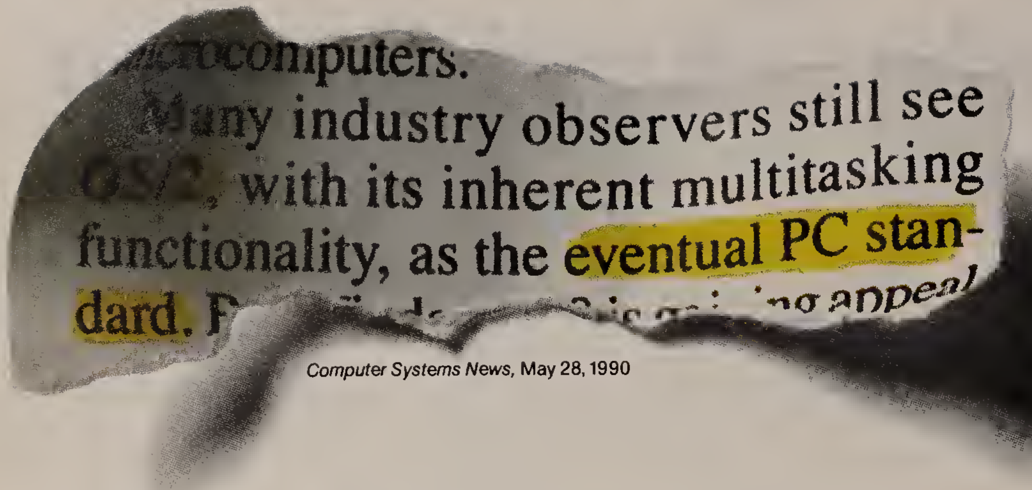
Banyan's VINES network operating software can make organizations of all sizes more productive, while minimizing operating costs. For a further description of St. Jude's networking problems and real-life solutions, write or call us at 800-828-2404 (in MA 508-836-2828).

BANYAN®

Networking. Without limits.

Copyright © 1990 Banyan Systems Incorporated, 120 Flanders Road, Westboro, MA 01581

See The FAXNeT Form on Page 55

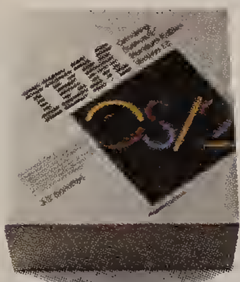


crocomputers.
Many industry observers still see OS/2, with its inherent multitasking functionality, as the eventual PC standard.

Computer Systems News, May 28, 1990

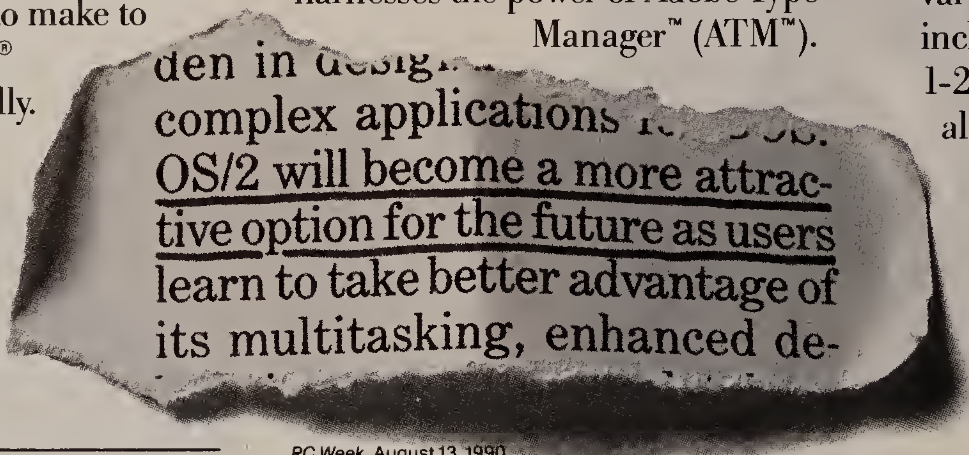
"Eventually" is here.

ANNOUNCING THE OS/2 YOU'VE BEEN WAITING FOR.



For quite some time, the press has been writing about the move everyone will want to make to OS/2.® Eventually.

Well, all at once OS/2 1.3 has made OS/2 the operating system it was meant to be—the one you'll want to move to right here and now.

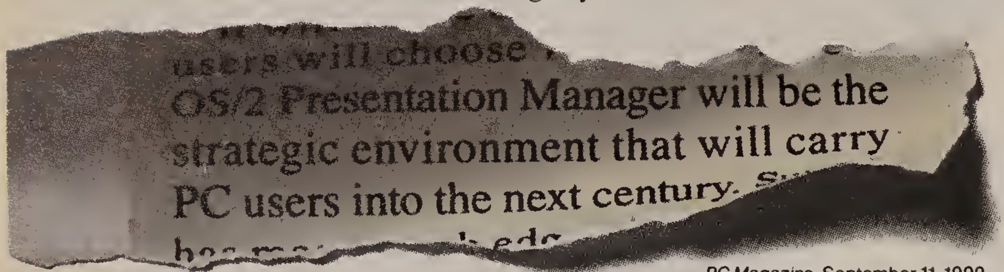


den in desig
complex applications
OS/2 will become a more attractive option for the future as users learn to take better advantage of its multitasking, enhanced de-

PC Week, August 13, 1990

OS/2 LOSES A LITTLE WEIGHT.

For starters, OS/2 has lost some of its appetite for memory. In fact, now you can make the move to OS/2 1.3 with as little as two megabytes on your system. What's more, this streamlined version leaves more room for applications and will offer some users a substantial performance increase in many system functions.



users will choose
OS/2 Presentation Manager will be the strategic environment that will carry PC users into the next century.

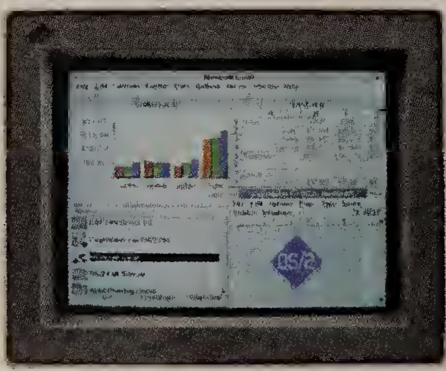
PC Magazine, September 11, 1990

FUNCTIONALITY. FUNCTIONALITY. AND DID WE MENTION FUNCTIONALITY?

Multitasking. Seamless connectivity. The ability to run applications larger than 640K. DOS® compatibility. All these features have made OS/2 appealing in the past, but new features have catapulted OS/2 into the here and now.

For instance, now OS/2 1.3 harnesses the power of Adobe Type Manager™ (ATM™). With this new feature, the quality of screen fonts has improved dramatically, giving you a true WYSIWYG capability so what you see is indeed what you get. ATM also gives OS/2 more flexibility in document creation by supporting a wide range of outline fonts.

Of course, what good is all this without printer support? Not much. So OS/2 1.3 has improved and expanded its printer support to include drivers for almost all popular printers.

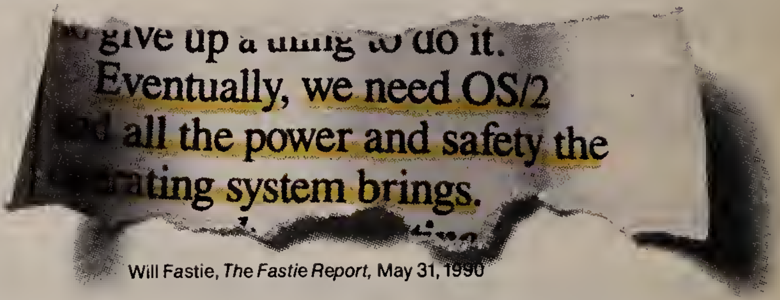


BUSINESS IS BOOMING.

Now that OS/2 is moving forward, so are software developers. Every day, more and more applications are joining the growing pool of available OS/2 software. In fact, a variety of major business programs, including Aldus® PageMaker,® Lotus® 1-2-3/G® and Microsoft® Excel, have already made the transition to OS/2.

These, along with many others, have been redesigned to go beyond DOS memory limits and take advantage of OS/2's intuitive graphical interface—Presentation Manager.™

It's been said that eventually you'll want to take advantage of everything OS/2 has to offer. Well, wait no more because "eventually" is here.



give up a thing to do it.
Eventually, we need OS/2
nd all the power and safety the
rating system brings.

Will Fastie, *The Fastie Report*, May 31, 1990

For more information on what OS/2 can do for you here and now, or to get details on a no-charge upgrade to Version 1.3, contact your IBM Authorized Remarketer or marketing representative.

OS/2 can do!

IBM

IBM and OS/2 are registered trademarks and Presentation Manager is a trademark of International Business Machines Corporation; Microsoft and DOS, registered trademarks of Microsoft Corp.; Adobe Type Manager and ATM, trademarks of Adobe Systems, Inc.; Aldus and Pagemaker, registered trademarks of Aldus Corp.; Lotus and 1-2-3/G, registered trademarks of Lotus Development Corp. ©1990 IBM Corp.

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

The regional Bell holding companies will spend about $1.5 billion on switching and transmission equipment this year, representing their highest level of projected spending for the next five years.

"Annual Telecommunications Equipment and Services Market Study"
Business Research Group
Newton, Mass.

People & Positions

Vitalink Communications Corp. last week said **Michael Yost,** vice-president of operations, unexpectedly resigned, setting off a restructuring of the company's executive staff.

Yost, who gave no reason for his departure, was responsible for Vitalink's manufacturing, service and engineering operations. He also was a member of Vitalink's executive staff.

The company has yet to name his replacement.

In addition, Vitalink announced that it is expanding its executive staff to include members from a variety of company departments previously not represented by executive staffers.

The move reflects a desire by new President and Chief Executive Officer Les Denend to flatten the management structure by allowing all departments to bring issues directly to top management.

Vitalink has added the vice-president of manufacturing and service, assistant vice-president of software engineering as well as the assistant vice-president of systems engineering to the executive staff.

Previously, the staff consisted of the CEO, chief financial officer, vice-president of marketing, vice-president of sales, vice-president of strategic relations and the vice-president of operations. ◻

NATA exec says U.S. gov't may stifle CPE competition

Spievack: FCC's bundling plan spells trouble.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The membership of the North American Telecommunications Association (NATA) is under unprecedented attack by the government, according to Edwin Spievack, president of the network equipment trade organization.

Spievack said initiatives by Congress and the Federal Communications Commission threaten to undermine the competition that has flourished in the network marketplace in the years since the FCC's 1968 "Carterfone" decision.

That decision allowed users to attach non-Bell System equipment to the public network and is credited with giving rise to the modern customer premises equipment market.

In an interview with *Network World,* Spievack denounced as blatantly illegal an FCC proposal to let AT&T and possibly all long-haul carriers bundle equipment as a free or discounted offering with transmission services.

He questioned whether customer premises equipment providers will be able to successfully market their products when the long-distance carriers are giving away equipment with services.

"What you're seeing is a complete abdication of government responsibility for maintenance of competition under healthy conditions and an affirmative refusal by the government to enforce the laws," Spievack said.

He said that if the FCC allows long-distance carriers to bundle equipment and services, NATA will appeal the decision to the U.S. Court of Appeals.

"If the FCC chooses to rule against us, they lose," Spievack

(continued on page 10)

PHOTO COURTESY OF NATA
Edwin Spievack

INDUSTRY BRIEFS

3Com moves ahead on backup deal. 3Com Corp. and Palindrome Corp. last week announced they have entered into an agreement to jointly develop OS/2 LAN Manager-based data network backup products using Palindrome's storage system management technology. The two companies plan to bring the capabilities of Palindrome's Network Archivist product, which now operates on Novell, Inc. NetWare networks, into the LAN Manager environment. The future product will carry 3Com's name and be marketed by 3Com.

EDS rethinks System One purchase. Electronic Data Systems Corp. (EDS) recently backed out of a $250 million deal announced two months ago to purchase Continental Airlines Holding, Inc.'s System One reservation network and other assets.

EDS cited an uncertain outlook for the transportation industry due to rising fuel costs as the main reason for canceling the deal. Both EDS and System One acknowledged that legal challenges from IBM Credit Corp. to the proposed transaction also affected the EDS decision.

A System One spokeswoman said IBM Credit had filed court papers stating that its contract arrangements with System One stipulate that the transfer of System One's IBM equipment could not be made without IBM Credit's permission, effectively blocking the sale. EDS and System One decided not to fight IBM Credit in court since EDS' interest in buying System One had weakened. EDS was to purchase the technology centers and telecommunications units of System One, as well as 50% of its computer reservation systems.

(continued on page 10)

Striving for stability

OSI/NM Forum policies to spur forum-compliant product development

- The forum will freeze the core elements of its Release 1 network management guidelines for 30 months after the addition of any enhancements to assure users that products based on the technology are stable.
- The forum will migrate its specifications so that they are aligned with emerging international network management standards within two years of their approval.
- The forum will strive for backward compatibility among all releases, including dot releases.

SOURCE: OSI/NETWORK MANAGEMENT FORUM, BERNARDSVILLE, N.J.
GRAPHIC BY SUSAN J. CHAMPENY

OSI forum focuses on interoperability

Group strives to inform users about the need for net management products that work together.

By Bob Brown
Senior Editor

BERNARDSVILLE, N.J. — Declaring 1991 the "Year of the User," the OSI/Network Management (OSI/NM) Forum is taking steps to speed vendor development of interoperable net management products and to spur user demand for them.

This past June, the OSI/NM Forum unveiled its Release 1 specifications for interoperable network management tools. The group is now carrying out an aggressive marketing blitz aimed primarily at educating users about the importance of the forum's work.

The forum's efforts include the Network Management Showcases, a series of demonstrations held at major trade shows that give users a first-hand look at net management products built to the group's specifications. Forum executives are also spreading the open network management gospel at user-oriented conferences, such as the recent Communications Managers Association meeting in New York.

In addition, the forum recently issued formal policies designed to assure users and vendors of the stability of the Release 1 specifications and their eventual migration to stable international standards (see graphic, this page).

"It's put up or shut up time for the forum," said Keith Willetts, forum chairman, in an interview with *Network World.* "We've produced the specs, we've come out with test tools and we've got a trade show program under way; we've removed every conceivable barrier there is to implementing Release 1. Now it's up to the vendors to build the products and up to the users to buy them."

Bart Stuck, president of Business Strategies, a Westport, Conn., consulting firm, said users will buy forum-compliant products once they hit the market.

"Users understand the power of using open systems and have seen what happens when they get locked into one vendor's offerings, so I think they'll belly up the money for forum-approved products," Stuck said. "But I think the forum has a way to go in marketing itself to users."

Keith Willetts

The Release 1 specifications are a set of guidelines to be used by vendors in building interoperable network management products ("OSI/NM Forum releases first specs for net mgmt.," *NW,* June 18). The first set of specifications cover fault and configuration management, two primary areas of concern for large network users.

British Telecommunications PLC was the first forum member to deliver a product incorporating the Release 1 specifications, said Willetts, who is British Telecom's manager of managed communications. British Telecom announced its ServiceDesk help desk offering — which is now

(continued on page 10)

NATA exec says U.S. gov't may stifle CPE

continued from page 9

said. "The law is overwhelmingly against them in this issue."

NATA was founded in 1970 by Tom Carter, inventor of the Carterfone, a device that connects mobile radios directly to the public network. Carter established NATA to represent the interests of customer premises equipment vendors, and the group now boasts 700 members.

But as NATA celebrates its 20th anniversary, Spievack offered a dark assessment of today's customer premises equipment market.

"Competition in the telecommunications industry is not in good health. Destructive price competition is rampant. Cross-subsidies by regulated and nonregulated companies is rampant. Liquidity for R&D is almost exhausted," he said.

Besides battling the FCC, NATA is also keeping its eye on Congress, where legislation from Sen. Ernest Hollings (D-S.C.) to permit the regional Bell holding companies to manufacture telecommunications equipment gained momentum last year.

NATA believes that the RBHCs would engage in anticompetitive activities, such as cross-subsidization, if allowed into manufacturing. Legislation to lift the equipment manufacturing restrictions is expected from both Hollings and Sen. Edward Markey (D-Mass.) next year, said aides of the senators at NATA's recent UNICOM '90 conference.

Industry Briefs

continued from page 9

Merger on hold. GTE Corp. and Contel Corp. last week warned that their planned merger is facing delays due to the pace of state regulatory approval on the deal.

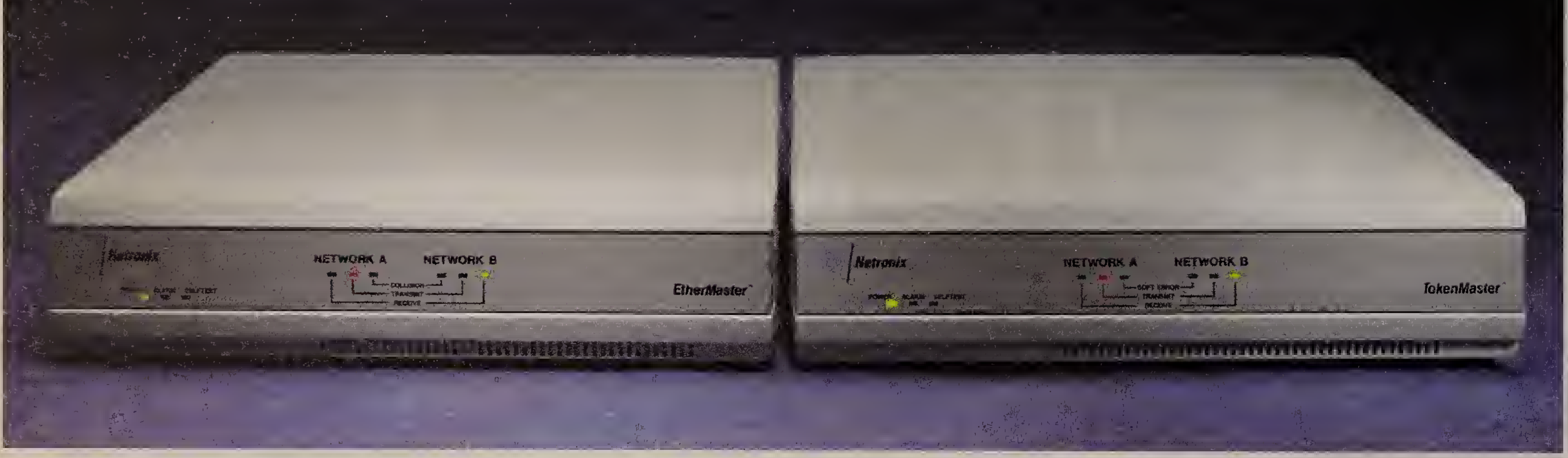
The merger, announced last August, would have combined the two telecommunications companies into one $38 billion corporation by the end of this year. But because the California regulatory commission is undertaking a full review instead of an expedited hearing, GTE and Contel do not expect the merger to be approved until the second quarter of 1991.

In addition to state approval, a shareholder vote on the merger, scheduled for Dec. 11, is needed, as well as approval from the Department of Justice and the Federal Communications Commission.

SynOptics deals for Macintosh connectivity. SynOptics Communications, Inc. and Farallon Computing, Inc. last week announced an agreement to jointly develop a communications module to extend the connectivity capabilities of the SynOptics LattisNet 3000 System, a network wiring hub, to Apple Computer, Inc. AppleTalk net users.

LattisNet provides Ethernet, Fiber Distributed Data Interface and token-ring support. The two companies will draw on Farallon's PhoneNET technology, which will let SynOptics support AppleTalk cabling to Macintosh computers.

NETRONIX INTRODUCES THE GENERATION GAP.



Announcing The Second Generation of Bridges.

We watched the competition, and learned from their mistakes. Then we built a better generation of bridges. Fully-featured, high-performance bridges. More secure. More affordable. And more reliable.

The 32 bit Ethernet bridge.

A 32 bit CPU and SNMP network management set our **EtherMaster 100** apart from DEC, RETIX and the others. Our CPU makes this bridge one of the fastest performing bridges available. And it means we can include source, destination and protocol filtering for greater network control.

Pay half as much for the same performance as DEC's bridge. Or get twice the performance for $150 more than RETIX.

Model*	Filter/Forward Rates	SNMP	Price	Management Software
Netronix EML-122	**25,000/12,500**	**YES**	**$3,400**	**Included**
DEC LAN Bridge 150	24.272/13,404	NO	$6,500	$1,562
RETIX 2265M	10,000/7,000	NO	$3,250	$1,450

*All models support AUI/ThinNet and Spanning Tree

A new generation of Token Ring. Bridges built to be bridges.

Because we use IBM Token Ring adapters, you're assured that our **Local TokenMaster 100** and **Remote TokenMaster 300** bridges are IBM compatible—and have a 4/16 Mbps data rate that really works. We offer better performance than IBM and we're LAN Manager/NetView compatible. But, instead of PCs, our TokenMasters are built to be bridges. They get the job done without a CRT, disk drive or keyboard. So, unlike IBM, rack mounting is easy. Unauthorized reconfiguring is unlikely. And disk failure is impossible.

Compare for yourself. Call **1-800-282-2535.** Or FAX to **1-707-763-6291.** And let us show you how our Second Generation is your number one bridge to the future.

Netronix
Technology That Works.™

Copyright © 1990 Netronix. Netronix, TokenMaster and EtherMaster are registered trademarks of Netronix. All other trademarks owned by their respective companies. All competitive product specifications acquired from manufacturer's literature.

OSI forum focuses on interoperability

continued from page 9

available in the U.K. — in June and demonstrated an integrated network management system in September at the TeleCommunications Association trade show in San Diego, the second in the forum's yearlong series of Network Management Showcase sites.

According to Willetts, British Telecom won't be the lone vendor with products at next year's Network Management Showcase. The Communication Networks '91 show in January in Washington, D.C. will feature "probably a half-dozen or more forum-compliant products that users can actually touch and feel," Willetts said.

Later next year, vendors will demonstrate interoperability of their forum-compliant products during showcase events, he said.

"We're hoping that we can demystify the forum at these events," Willetts said. "We want to encourage users to put forum compliance in their RFPs."

John Payne, staff telecommunications analyst at Charles Schwab & Co., Inc., a brokerage firm in San Francisco, said his company is currently considering a requirement for vendor support of OSI/NM Forum specifications in all future network management purchases.

"We don't see any other means by which we can start down the road to integrated network management," Payne said.

Larry Thomas, general manager of network management systems at Unisys Corp. and vice-president of strategy and planning for the forum, said he is hopeful that the forum's recent policies regarding specification stability and migration to international standards will encourage vendors to deliver forum-compliant products.

"Continuity is an important incentive," Thomas said.

So far, major vendors such as AT&T, British Telecom and Unisys have been the most active in developing forum-compliant products. Some smaller forum members "may be dithering," Willetts acknowledged.

"Some members are asking if this is MAP/TOP all over again." Willetts said. The Manufacturing Automation Protocol/Technical and Office Protocol group was criticized in the past for revising specifications so often that users were confused about which version to employ. "They want to know if they are going to be investing heavyweight dollars into something that is going to change every five minutes," he said.

See The FAXNeT Form on Page 55

TELECOMMUNICATIONS

CARRIER SERVICES, CENTREX, CPE, WIRING SYSTEMS AND BYPASS

Worth Noting

AT&T recently bought a $6 million, 10-ton robotic seabed tractor to help it install undersea cable. The vehicle can lay cable along the ocean floor in water up to a mile deep.

Carrier Watch

At last week's National Centrex Users Group conference in San Diego, **Southwestern Bell Telephone Co.** and **Pacific Bell** detailed plans to improve their nets and roll out Centrex features and services.

Pat Parker, vice-president of marketing for Texas at Southwestern Bell Telephone, said the firm will spend $100 million over the next five years for new net switching equipment, software and digital transmission facilities. One third of that sum will be spent in 1991, she added.

The company plans to spend $460 million over the next three years to equip 300 central offices in its five-state region to support Common Channel Signaling System 7, Parker said. Southwestern Bell Telephone, which uses customer-specific contracts to offer its largest users off-tariff pricing for Centrex service, will move further from tariff pricing to stay competitive.

Pacific Bell gave users a timetable for new Centrex features and services. The company will also begin offering Centrex users the option to receive monthly bills on diskette rather than on paper beginning next month. Availability of billing information on diskette will enable users to selectively extract data for report purposes.

Pacific Bell will begin the rollout of caller identification service with call blocking to Centrex users over ISDN Basic Rate Interface lines in the fourth quarter of 1991. The firm said it will continue to partner with equipment vendors to offer users turnkey systems comprising Centrex service and equipment.

Rate cases pending before the FCC

State	Company	Date filed (in 1990)	Amount pending (Millions of dollars)*
Arkansas	Contel of Arkansas, Inc.	February	$3.9
California	Pacific Bell	February	$35.0
Colorado	US West Communications, Inc.	September	$108.5
Florida	United Telephone Co. of Florida	May	$25.4
Illinois	Contel of Illinois, Inc.	February	$8.3
Iowa	GTE North	May	$11.7
Kansas	J.B.N. Telephone Co.	May	$0.3
Maine	Contel of Maine, Inc.	June	$0.3
New Jersey	United Telephone Co. of New Jersey	July	$11.1
New Mexico	GTE Southwest	July	$2.2
New York	New York Telephone Co.	March	$832.0
West Virginia	GTE South	August	$7.5
Wisconsin	GTE North	April	$20.6
Total value of pending cases:			$1,066.8

*All figures are rounded off.

SOURCE: FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.
GRAPHIC BY SUSAN J. CHAMPENY

Study says state regulators holding line on rate hikes

States order $404m in rate cuts to date in 1990.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Across the country this year, state public utility commissions kept a tight lid on prices for local services, a trend that began in 1987 after three years of post-divestiture rate hikes.

According to a recent report issued by the Industry Analysis Division of the Federal Communications Commission, state regulators ordered $404 million in local rate reductions during the first three quarters of 1990. This compares to $359 million during the corresponding period in 1989.

State regulators virtually ignored requests for rate increases this year, instead ordering rate-reducing programs such as customer credits, elimination of taxes, restructuring of service costs and access charges, and revenue sharing plans for users.

The quarterly report compiles data from the Bell operating companies, Contel Corp., GTE Telephone Co. and United Telecommunications. These firms carry about 90% of all local traffic in the U.S.

Although local carriers had asked state commissions for $66 million in rate increases this year, regulators granted only a portion of that sum.

The largest rate increase allowed this year was a $13.7 million increase granted to GTE North in Michigan. New England Telephone and Telegraph Co. also won a $11.6 million increase in New Hampshire.

But even those rate increases were small victories since both carriers had requested about double the amounts granted. GTE North had asked for an increase of $22.8 million in Michigan and New England Telephone had asked for a $21 million increase in New Hampshire.

Carriers requested and received rate increases in only six other areas — Iowa, Missouri, New Hampshire (Contel), South Carolina, Tennessee and West Virginia. All of the requests were for less than $10 million, and state regulators granted increases of $2 million or less in each instance.

Telecommunications rates have become a political hot potatothis year with acrid battles arising, such as the one between New York Telephone Co. and the New York Public Service Commission (PSC).

> State regulators virtually ignored requests for rate increases this year.
>
> ▲▲▲

After a six-year moratorium on rates, Nynex Corp. requested a rate increase of $964.6 million, but later scaled back the request to $831.7.

But late last month, three administrative law judges at the PSC ruled that Nynex's rate request was excessive and recommended that state regulators grant only $23.6 million of the requested rate increase. In part, the judges said the carriers' current rate of

(continued on page 12)

NTI server widens ACD service options

Northern Tel tool enables local telcos to offer common ADC service using varied CO switches.

By Bob Wallace
Senior Editor

SAN DIEGO — Northern Telecom, Inc. last week announced a device that will enable local telephone companies to offer switch-independent, central office-based automatic call distributor (ACD) services.

Unveiled at the National Centrex Users Group (NCUG) conference here, the Meridian ACD Server is an adjunct switch running special ACD software for AT&T, Ericsson, NEC America, Inc. and Siemens AG central office switches. Northern Telecom switches need only new line cards and extra memory to support the service.

The central office-based server, which can handle as many as 4,000 agents, works with Northern Telecom's current Meridian Digital Centrex telephone sets and industry-standard 2500-type phone sets, a company spokesman said.

Meridian ACD Server will enable regional Bell holding companies and independent telephone companies to offer a single ACD service, supported across existing switches, throughout their territories.

Today, ACD services are only supported on high-end switches, such as AT&T's 5ESS and Northern Telecom's DMS-100. They are only offered to large users under customer-specific contracts.

Further, there is no interoperability between ACD services supported by different vendors' switches. A user with two call centers in the same city, each served by a different central office switch, cannot exchange calls between the sites or combine agent groups to improve efficiency.

US West, Inc. announced here that it is planning to use Meridian ACD Server to provide a common ACD service from its AT&T, Northern Telecom and Ericsson switches. The RBHC last week signed a letter of intent to buy an unspecified number of systems from Northern Telecom, ac-

(continued on page 16)

WASHINGTON UPDATE

BY ANITA TAFF

Firestone defends price cap regulation. Richard Firestone, chief of the Federal Communications Commission's Common Carrier Bureau, told attendees at a conference on price cap regulation that the reluctance of some local carriers to voluntarily adhere to price caps is evidence that users will benefit from the new form of regulation.

Adherence to price cap regulation is mandatory for the seven regional Bell holding companies and GTE Telephone Operations. When the deadline for other carriers to decide whether they would participate passed earlier this month, only two other companies — Contel Corp. and United Telecommunications, Inc. — had opted to join. Firestone said the reluctance of other carriers to sign up for price caps may be because it is a demanding plan. "The plan the commission adopted is tough — billions of dollars tougher than the plan that had previously been proposed," he said.

"Some [carriers] may wait to see how the rest of the industry makes out," he added. Carriers can opt to join price caps at any time during the four-year initial phase of the plan.

The FCC made several changes to the price cap plan that are expected to benefit consumers, Firestone said. He pointed out that the FCC had raised the productivity requirements for the carriers, revised parts of the price cap formula to cause prices to fall when volume increases and included a provision for local carriers to share excess profits with users.

FTS users may be paying higher rates. According to a study released last week by the research firm International Data Corp. Washington, Inc., users of the government's Federal

(continued on page 12)

Bell Atlantic offers glimpse at SMDS pricing

By Ellen Messmer
Washington Correspondent

ARLINGTON, Va. — At a recent conference here exploring future network directions, Bell Atlantic Corp. became the first RBHC to publicly discuss pricing of Switched Multimegabit Data Services (SMDS), a high-speed switched offering promised in the near future.

John Hudak, product manager at Bell Atlantic, said the company is in the final stages of drafting tariffs for new SMDS offerings that it plans to roll out in latter part of 1991.

Speaking at the Fourth Annual Conference on Next-Generation Networks, Hudak said Bell Atlantic wanted to be the first of the regional Bell holding companies to publicly talk of pricing.

Hudak, while cautioning that his information was tentative, said initial SMDS services, offered at T-1 and T-3 speeds, will be priced between 10% to 30% less than T-1 and T-3 access services offered today.

Hudak said the high-speed switched data service will also carry a monthly usage charge, although users will get 50G bits of monthly usage as part of the access fee. ”

He said the company has not determined pricing for usage of more than 50G bits.

Bell Atlantic's SMDS offerings will initially be available in Baltimore, northern New Jersey, Philadelphia, Richmond, Va., and Washington, D.C.

Hudak said the RBHC will eventually introduce SMDS services with speeds in excess of T-3, adding capacity in increments of 4M, 8M, 10M and 14M bit/sec, but acknowledged that the carrier must overcome some technical restrictions in order to offer such services.

Hudak noted that pricing for SMDS will reflect the costs of installing new equipment.

Bell Atlantic is currently evaluating vendor proposals for equipment and installation. It said it hopes to make a selection by year end.

Hudak said that a Bell Atlantic survey conducted last July of 275 data communications managers in manufacturing, health care, government and other industries, found that 40% to 70% of the managers were ready to migrate to SMDS services from their private networks.

A trial of 45M bit/sec SMDS being conducted by Bell Atlantic and Temple University is proceeding well, said Doug Walton, director of computer services at the Philadelphia-based university.

High-speed switching equipment from QPSX Communications is being used to link 16 Ethernets and two token-ring networks at several campus sites as far as 17 miles apart. ☐

Washington Update

continued from page 11

Telecommunications System (FTS) 2000 telecommunications system may be paying higher rates for service than their private sector counterparts.

The study, which was based on interviews with numerous government officials who were granted anonymity, said users have complained that FTS 2000 data services are overpriced. It cited research by an unnamed agency that showed that, compared with what government agencies pay under FTS 2000, current MCI Communications Corp. prices were 30% cheaper for T-1, 10% to 15% cheaper for 56K bit/sec, and 10% to 11% cheaper for 9.6K bit/sec lines. ☐

RBHC rate request decisions by PUCs

Year	Millions of dollars	
	Rate requested	Rate ordered
1985	$2,640.5	$1,154.9
1986	$1,758.4	$290.0
1987	$93.4	-$519.0
1988	$272.4	-$1,366.4
1989	$181.7	-$838.5
1990*	$66.1	-$404.1

*Figures are for the first three quarters only.

SOURCE: FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.
GRAPHIC BY SUSAN J. CHAMPENY

Regulators holding line on rate hikes

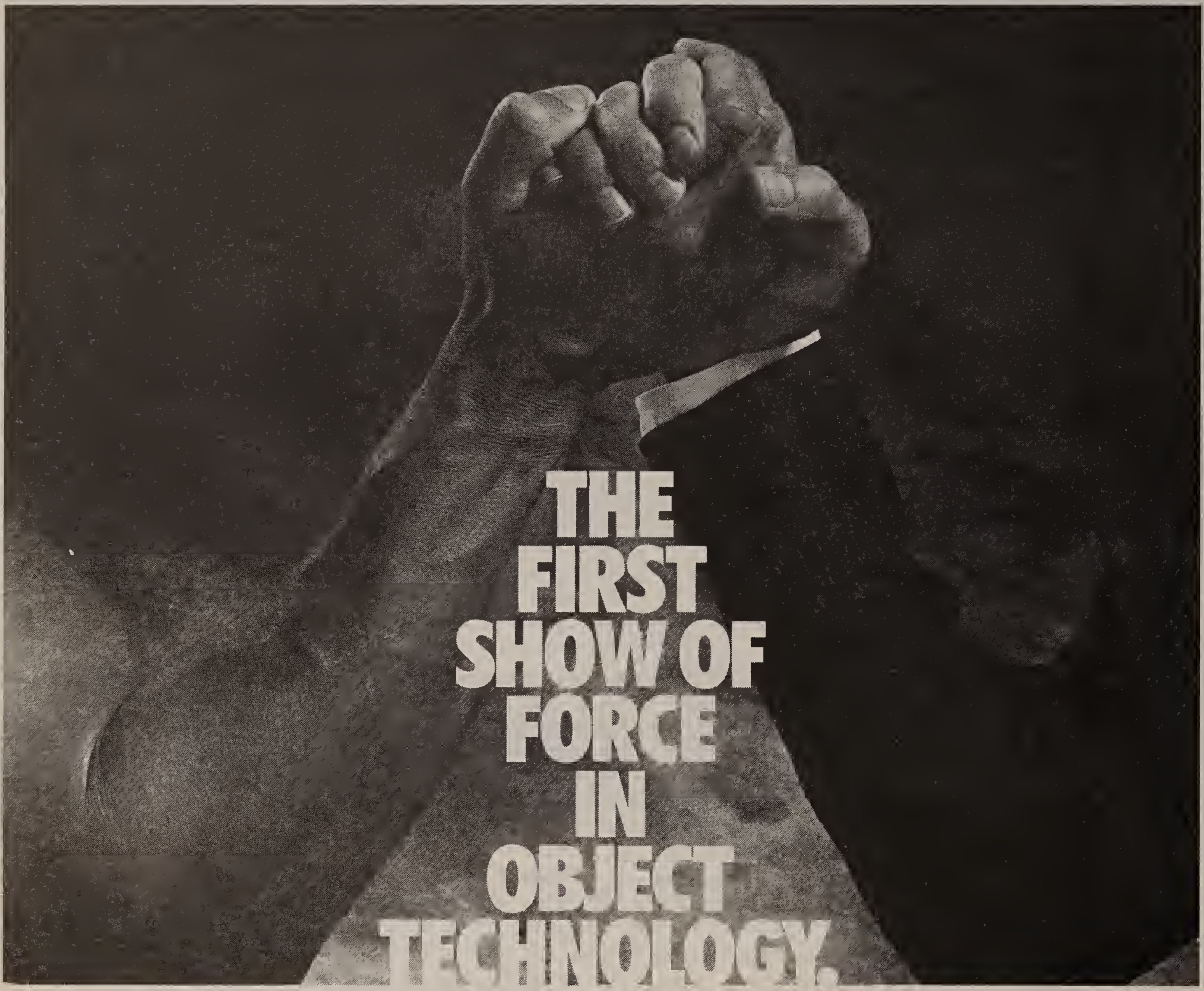
continued from page 11

return was too high and ordered a decrease of $136 million and also disallowed another $108 million Nynex said it needed for network maintenance.

Also this year, the FCC disallowed $1.6 billion in local access rate increases sought by carriers, saying the firms had included inappropriate costs in their requests, such as some lobbying costs, or had inflated their revenue needs.

High-profile rate wars may become increasingly common if state regulators maintain their hard line on increases. According to the FCC's report, at the end of the third quarter, state regulators still had more than $1 billion in pending rate requests from carriers.

If the states continue their three-year trend, only a small fraction of those increases will be allowed. ☐



ANNOUNCING OBJECT WORLD, JUNE 3-7, 1991, SAN FRANCISCO.

Why are more and more smart companies embracing object technology? Because they want to get an edge on the competition.

Object World will bring together users and vendors of object-oriented technology for five intensive days of seminars, conferences, and exhibits.

For the first time, MIS managers, strategists, software developers, and hardware manufacturers will gather in one location to exchange ideas, share technology, and tackle issues of importance.

Discover why companies with a track record of identifying and implementing new technologies have placed their bets on object technology.

Get a jump on the competition. Complete the coupon below for information on attending or exhibiting at Object World, June 3-7, 1991, at the Fairmont Hotel in San Francisco.

It's the first show of force in object technology.

OBJECT WORLD

Object World is sponsored by the Object Management Group, the leading organization dedicated to promoting the commercial success of object technology worldwide. The event is produced by World Expo Corp., an International Data Group Company, the world's leader in information services on information technology.

TAKE PART IN OBJECT WORLD, JUNE 3-7, SAN FRANCISCO.

For more information, please call (800) 225-4698 or complete this coupon and mail it to: Object World, c/o World Expo Corp., 111 Speen Street, P.O. Box 9107, Framingham, MA 01701-9107. Can't wait? Reply by Fax: (508) 872-8237.

☐ **YES.** I'm interested in exhibiting at Object World. Please send the details.

☐ **YES.** I'm interested in attending Object World. Please send me information.

NAME____________________
TITLE____________________
ORGANIZATION____________________
STREET____________________
CITY____________STATE/ZIP________
TELEPHONE____________________
NWW

See The FAXNeT Form on Page 55

Announcing the end of the phone bill.

Introd

The AT&T Intelli

It tells you more about you

AT&T Billing Information Manager. The intelligent way to bring order to your billing.

Give your business the benefit of the Intelligent Phone Bill from AT&T Billing Information Manager. Here are just a few examples of what it can do for you.

☐ Executive Summary:

You can learn a lot from your phone bill when AT&T Executive Summary Reports break out your billing. This can help you pinpoint busy days. Identify unusually long or short calls. As well as discover patterns and trends hidden in your call traffic. And the best thing is that all this information is standard with your monthly bill on most of our services.

☐ Detail Manager:

Maybe you need a more detailed report. With AT&T Detail Manager, you can get a customized billing report any way you want it. Zip code, area code, frequency of usage, length of call, city, state, even cost category. You name it, we do it. Once your billing is in order, information becomes clearer and you can better manage your business.

☐ Execu-bill:

Organize your billing by calling card. With AT&T Execu-bill reports, we can break out your calling card usage by location, region or department. In fact, these reports can be designed to match

© 1990 AT&T

ucing

gent Phone Bill.

usiness than what you owe.

your corporate structure. So you can control calling card use, identify high cost centers and track expenses more easily.

☐ Call Manager:

AT&T Call Manager can organize your billing with the push of a button. Just enter a code and the call is automatically sorted as you dial. It makes life easier for anyone who has to assign costs to clients and projects, account for business and personal calls or keep track of departmental expenses.

☐ Summary Billing:

Now when it comes to billing, we can break it out and send it out in a way that matches your company's structure. With AT&T Summary Billing, we can provide service information to your branch offices and send the bill to your main office. Or we can do just the opposite. You decide who gets what information, and in the end, the bill is easier to pay.

So whether you need a lot of detail or just a little, we have an option that's just right for you. The AT&T Intelligent Phone Bill. It'll be the one bill you'll find a pleasure to read.

AT&T Billing Information Manager.
Another AT&T advantage.

For more information, contact your AT&T Account Executive or call 1 800 247-1212, Ext. 142.

AT&T
The right choice.

ISDN's ANI streamlines Vistakon's call processing

By Bob Wallace
Senior Editor

SANTA CLARA, Calif. — Vistakon, Inc.'s use of Integrated Services Digital Network automatic number identification (ANI) has reduced by 20% the time needed to process each customer call.

Vistakon, a Johnson & Johnson company, discussed its ISDN application at the recent National Rolm Users Group meeting here.

The disposable contact lens maker began using ANI several months ago to help in handling the thousands of calls that come into its national telemarketing center in Jacksonville, Fla.

When customers call Vistakon's 800 number to order products, their calls are passed from an AT&T 4ESS switch over Primary Rate Interface links via a Rolm Co. 9757 ISDN Adapter to a Rolm 9751 CBX configured as an automatic call distributor.

Routing tables containing customer numbers in the 9751 determine if the caller is a top customer, regular customer or has a delinquent account and routes the call to the corresponding agent group, said Jeffrey Van Doren, director of advanced systems and technologies for Vistakon.

The ANI is passed from the 9751 to Vistakon's Applications System/400 minicomputer. The processor matches the ANI with the appropriate customer file, which is then sent to the agent's workstation before the call arrives, Van Doren said.

Before ANI, agents asked each caller for their account number and keyed that into their workstations to trigger the data base lookup. Van Doren said ANI has helped cut costs but would not say by how much. ◘

Server widens ACD options

continued from page 11

cording to Robert Meldrum, ISDN marketing manager for US West.

"We expect the service to be attractive to midsize and small businesses in the health care and financial services industries that can't afford [customer premises-based] ACDs," Meldrum said.

Meridian ACD Service will enable US West to offer ACD service from old analog switches, such as AT&T Network Systems Group's 1AESS, which is currently unable to support ACD service.

US West will test Meridian ACD Server to verify its interoperability with AT&T, Ericcson, NEC America and Siemens central office switches. If all goes well, US West will roll out central office ACD service in five metropolitan areas — Denver, Minneapolis/St. Paul, Phoenix, Portland, Ore., and Seattle — in late January or early February, Meldrum said. The RBHC would then introduce the service to eight second-tier cities — Albuquerque, N.M., Boise, Idaho, Des Moines, Iowa, Eugene, Ore., Omaha, Neb., Salt Lake City, Spokane, Wash., and Tuscon, Ariz., by year end.

Meldrum refuted reports that claimed US West would offer ACD service throughout its 14-state region by year end 1991. "It's a very lofty goal, but it's not realistic," he said.

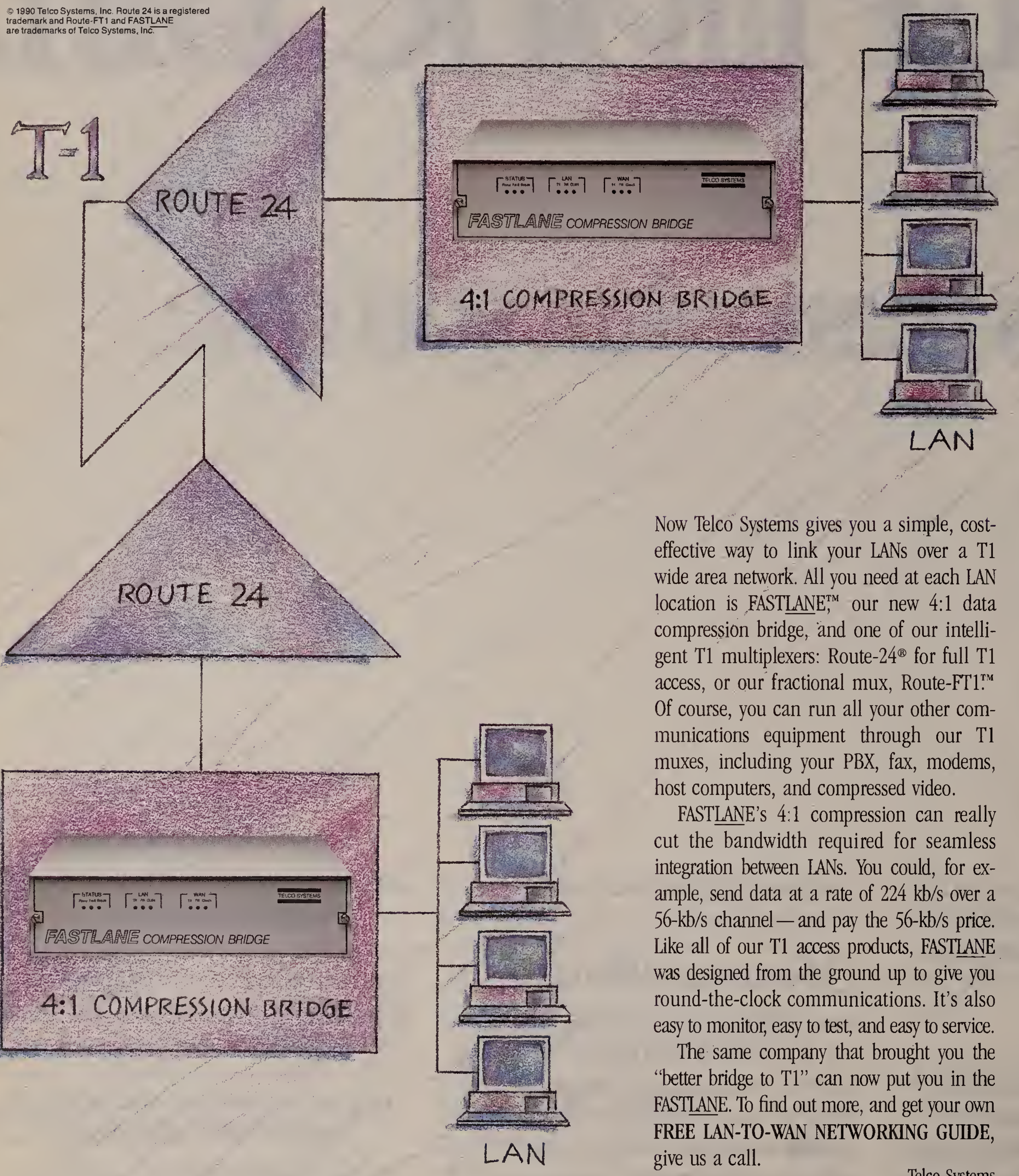
Like other RBHCs, US West currently offers uniform call distributor (UCD) service under general tariff, primarily from AT&T 1AESS switches, but does not have a tariffed ACD service.

UCDs pass incoming calls in hierarchical order, from the first agent to the last, regardless of whether agents are free to take the calls. Users cannot change the call distribution order. This makes UCDs less efficient than ACDs, which can pass incoming calls to the first available agent.

Swamped with requests from its midsize and small customers for ACD service, US West issued in June 1989 a request for proposal for a central office-based solution that would enable it to offer ACD service from central office switches made by different vendors, Meldrum said.

"Northern Telecom responded faster than its [rivals] and put forth a very strong solution," Meldrum said. ◘

© 1990 Telco Systems, Inc. Route 24 is a registered trademark and Route-FT1 and FASTLANE are trademarks of Telco Systems, Inc.



Now Telco Systems gives you a simple, cost-effective way to link your LANs over a T1 wide area network. All you need at each LAN location is FASTLANE,™ our new 4:1 data compression bridge, and one of our intelligent T1 multiplexers: Route-24® for full T1 access, or our fractional mux, Route-FT1.™ Of course, you can run all your other communications equipment through our T1 muxes, including your PBX, fax, modems, host computers, and compressed video.

FASTLANE's 4:1 compression can really cut the bandwidth required for seamless integration between LANs. You could, for example, send data at a rate of 224 kb/s over a 56-kb/s channel—and pay the 56-kb/s price. Like all of our T1 access products, FASTLANE was designed from the ground up to give you round-the-clock communications. It's also easy to monitor, easy to test, and easy to service.

The same company that brought you the "better bridge to T1" can now put you in the FASTLANE. To find out more, and get your own **FREE LAN-TO-WAN NETWORKING GUIDE,** give us a call.

Telco Systems
4305 Cushing Parkway
Fremont, CA 94538
FAX: 415-656-3031
TEL: 800-776-8832

LAN to WAN on A Narrow Band

TELCO SYSTEMS

See The FAXNeT Form on Page 55

See the Action Center for
networking products & services!

Use the Action Center Reader Service Card
and get free information
on networking products & services.

Worth Noting

"X.400 is probably going to be the No. 1 use for OSI networks for a while."

David Passmore
Partner
Ernst & Young's
Network Strategies
Fairfax, Va.

Data Packets

Router vendor **cisco Systems, Inc.** last week released software that will enable computers running Digital Equipment Corp.'s DECnet Phase IV and DECnet Phase V network software to exchange data.

The Transition Gateway software runs on cisco Systems' routers and supports DEC's implementation of the International Standards Organization's (ISO) End System-to-Intermediate System (ES-IS) protocol.

ES-IS enables a DECnet Phase V node to communicate with a router.

The new software also translates a DECnet Phase IV address to a DECnet Phase V address.

This capability enables one cisco System router using that vendor's proprietary Interior Gateway Routing Protocol to pass the traffic to another cisco System router that is capable of forwarding it to the target end node.

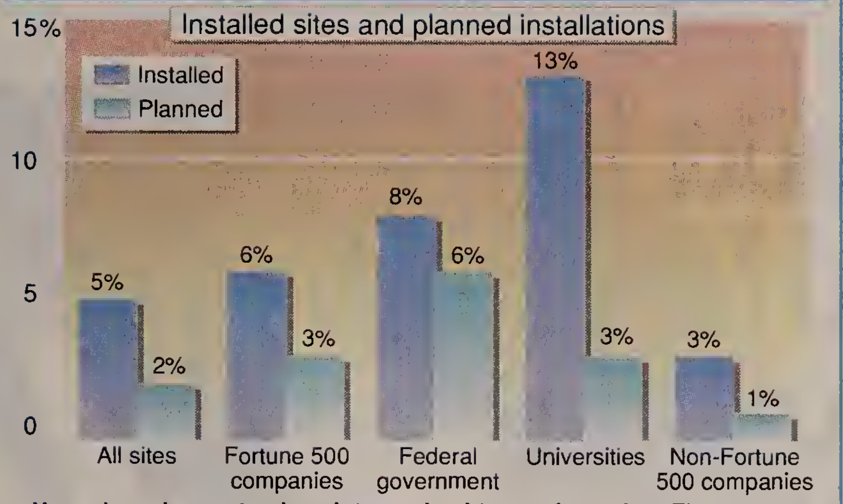
Support for Transition Gateway software is the second step in cisco Systems' three-part plan for adding complete DECnet Phase V support to its routers.

Last May, the firm introduced software that enables its routers to pass traffic between DECnet Phase V end nodes.

The company said it also plans to add support for ISO's emerging Intermediate System-to-Intermediate System (IS-IS) protocol when that standard is finalized sometime next year.

Support for IS-IS will pave the way for cisco Systems' routers to communicate with DEC's routers for the first time.

User interest in videoconferencing



Users have begun to show interest in videoconferencing. Figures are based on interviews at 19,000 sites.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: COMPUTER INTELLIGENCE, LA JOLLA, CALIF.

CCITT approves standards for higher speed modems

OKs draft standards for 14.4K bit/sec modems.

By Jim Brown
Senior Editor

GENEVA — The Consultative Committee on International Telephony and Telegraphy Study Group XVII approved at a meeting here last month a pair of new draft standards for modems that will support data transmission at speeds up to 14.4K bit/sec.

In addition to supporting a higher speed than V.32 modems that operate at 9.6K bit/sec, the draft V.32bis standard will let modems that have cut back their transmission speeds to compensate for degrading line conditions resume higher speeds when line conditions improve. Currently, users must terminate and then reestablish a link to regain higher speed operation.

The draft V.17 standard will enable CCITT Group III facsimile machines to communicate at 14.4K bit/sec, as opposed to the current limit of 9.6K bit/sec.

Both draft standards are now going through CCITT's accelerated procedure for formal adoption as international standards. Under the accelerated procedure, approval is expected within the next six to eight months. Based on this, many vendors are building support for the standards into their modems and will start shipping V.32bis and V.17 modems by year end.

The accelerated process sidesteps a long-standing CCITT rule stipulating that standards can only be formalized at plenary meetings, which are held once every four years, said Steve Turner, manager of the technical staff at Universal Data Systems, Inc., a modem maker in Huntsville, Ala., and a U.S. delegate to CCITT Study Group XVII. The next plenary meeting is set for 1992.

Turner and other members of the study group anticipate that the standards will pass the accelerated process with no problem.

"Once the study group agrees on a draft, it in essence carries all the weight of a full standard," said Dale Walsh, vice-president of advanced development for U.S. Robotics, Inc., a modem maker in Skokie, Ill.

The pending V.32bis standard is an improvement on CCITT's existing V.32 standard, which defines how to build modems that operate at 9.6K bit/sec and can automatically fall back to 4.8K bit/sec when dial-up line conditions degrade.

Modems complying with V.32bis will operate at 14.4K bit/sec and support fallback rates of 12K, 9.6K, 7.2K and 4.8K bit/sec, Walsh said.

> Many vendors are building support for the standards into their modems.
>
> ▲▲▲

In order to let the modem resume a higher speed after fallback, however, vendors will have to build their own software into V.32bis modems. "The capability is there to switch speeds, but the standard is silent on any strategy for how to instruct the modem to use that capability," Walsh said.

The pending V.17 standard will be used to boost the speed of CCITT Group III fax modems to

(continued on page 71)

Adaptive switch gets a mixed reception

Analysts praise capabilities of T-3 switch but say its usefulness is limited by lack of services.

By Paul Desmond
Senior Editor

REDWOOD CITY, Calif. — Most analysts are giving Adaptive Corp. high marks for its recently announced broadband T-3 switch because it supports emerging technologies, but others feel the switch is ahead of its time.

Several analysts cited the switch's Synchronous Optical Network (SONET)-based switching core and its ability to access switched T-1 and T-3 services as features that separate it from an emerging field of products. But others were unimpressed with those features since both SONET and high-speed switched services are not available from carriers.

Adaptive's SONET Transmission Manager (STM) Broadband Network Switch is the company's first product ("Firm unveils SONET-based T-3 switch," *NW*, Nov. 5). The company was formed about a year ago as a spinoff of Network Equipment Technologies, Inc.

"It's going to be the Cadillac of the T-3 switching multiplexers that are available," said Mark LaRow, senior manager at Ernst and Young's Network Strategies in Fairfax, Va.

"It'll be much more feature-rich than any of the enhanced [digital access and cross-connect systems], such as what Timeplex [Inc.] and Infotron [Systems Corp.] have," LaRow said. "In terms of volume and SONET connectivity, it appears to exceed what Newbridge [Networks, Inc.] has with its high-end T-3 mux."

Adaptive emphasized that the STM was built around a SONET switching matrix, which means it switches 1.728M bit/sec SONET channels instead of the 1.544M bit/sec T-1 channels. Analysts said that choice should save the firm the trouble, expense and

(continued on page 71)

U.S. Robotics introduces V.32bis-compatible modem

By Jim Brown
Senior Editor

SKOKIE, Ill. — U.S. Robotics, Inc. last week became the first vendor to unveil modems that comply with the CCITT draft V.32bis standard.

The Courier V.32bis and Courier HST Dual Standard modems can support synchronous or asynchronous data transmissions in full-duplex mode over dial-up lines at 14.4K bit/sec, the speed defined by V.32bis.

The modems also make use of a speed adaption feature built into V.32bis. This feature enables a V.32bis modem that has cut back to a slower operating speed to compensate for degrading line conditions to increase its speed once the line condition improves.

While V.32bis defines the set of modem control messages the transmitting and receiving modems use to adjust speed upward, it does not define a technique for monitoring the line to determine when speed should be increased.

U.S. Robotics' two new modems come with a proprietary Adaptive Speed Leveling feature that provides this functionality.

Both modems also support the CCITT V.42 error correction and V.42bis data compression standards. V.42 uses the CCITT Link Access Procedure M and Microcom, Inc.'s Microcom Network Protocol (MNP) error correction protocols. V.42bis uses a CCITT-developed compression protocol as well as MNP Class 5 data compression.

With V.42bis support, the modems are able to achieve a throughput rate under optimal line conditions of up to 38.4K bit/sec, the speed at which they receive data from a piece of data terminal equipment.

Both Courier V.32bis and Courier HST Dual Standard modems come in two models: stand-alone units that will ship next month and microcomputer add-on boards that will ship in March 1991. The stand-alone Courier V.32bis is priced at $995, while the stand-alone Courier HST Dual Standard costs $1,295. The Courier V.32bis modem board is priced at $945, and the Courier HST Dual Standard modem board costs $1,249.

US Robotics is offering a program under which users can trade in any vendor's modem and pay $545 for a Courier V.32bis or Courier HST Dual Standard.

The Leader In
High-Speed Modems
Offers Another
Startling
Performance
Figure.

V.3

32

The best choice in high-speed, dial-up modems is now the best choice in V.32 modems.

Telebit has become the leading supplier of high-speed dial-up modems by delivering faster, more robust and reliable performance in mission-critical applications.

In fact, we created the market in 1985 with the TrailBlazer.®

Now we've put the same advanced technology and U.S.-built quality into a family of V.32 modems that sets a whole new standard of performance for CCITT-standard products.

Our T2500 was the first V.32 modem to deliver the full implementation of V.42 error-correction and V.42*bis* high-performance data compression capabilities. The T2500 supports all industry standards, as well as our patented multicarrier Packetized Ensemble Protocol® (PEP) technology.

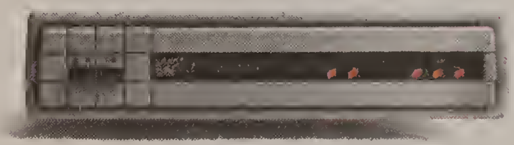
Unlike competitive modems that hang up when line quality drops, PEP allows the T2500 to keep transmitting. Giving you real-world throughput that outclasses anything in its class.

You might think you'd pay a premium for this kind of performance, but actually our entire family of high-speed modems is very competitively priced, from $745 to $1495 (quantity one list price).

Call 1-800-TELEBIT today for more information on our V.32 modems. And the name of your nearest distributor.

Telebit. The highest quality, not the highest price.

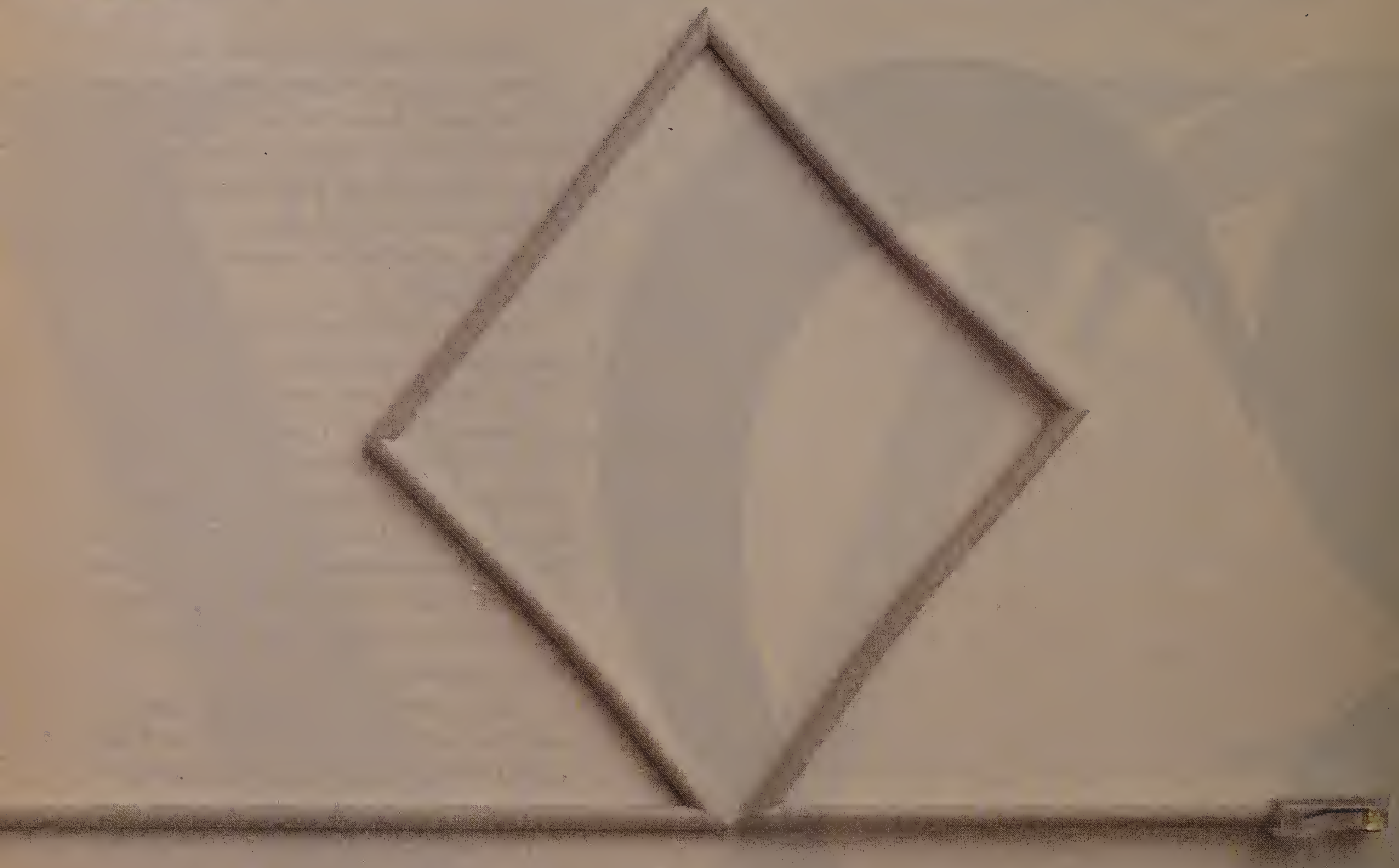
TELEBIT®
When connectivity counts.



See The FAXNeT Form on Page 55

© 1990 Telebit Corp. (408) 734-4333 FAX: (408) 734-3333. Telebit, TrailBlazer and PEP are registered trademarks of Telebit Corp.

WHEN THE STAKES ARE HIGH, CHOOSE SUPERIOR TECHNOLOGY



LATTISNET SYSTEM 3000

Your local area networks grow more valuable over time. More and more, they're expected to deliver a multifaceted, highly sophisticated utility service. The more complex they get, the more you want an integrated, flexible system that satisfies your connectivity requirements.

SynOptics Communications knows what you need – superior technology that delivers the standards-based, multivendor utility that will satisfy your networking requirements for years to come.

As the cornerstone of SynOptics' *Network Utility Architecture* – a concept that regards networks as indispensable communications utilities -- we've developed the System 3000 family, a value-added networking system that will carry you into the 1990s.

The System 3000 offers:

- advanced network management;
- a full-color graphic representation of the network;
- simultaneous support of Ethernet, Token Ring and FDDI LANs; and
- integrated local bridging.

SynOptics is delivering the value-added LAN solutions of the future – today.

With over 200,000 twisted-pair nodes shipped to more than 500 customer sites worldwide, SynOptics is the leader in twisted-pair Ethernet. As a standards-based company, SynOptics designs its products with a migration path to emerging and de facto standards. Now, with the System 3000, SynOptics is shaping the future of networking with product solutions today.

For more information about the System 3000, call SynOptics toll-free at (800) PRO-NTWK.

SynOptics
Communications, Inc.

SynOptics Communications, Inc. 4401 Great America Pkwy., P.O. Box 58185, Santa Clara, CA 95052-8185

© 1989 SynOptics Communications, Inc. LattisNet is a registered trademark and SynOptics is a trademark of SynOptics Communications, Inc.
Other brand and product names are trademarks or registered trademarks of their respective holders.

See The FAXNeT Form on Page 55

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

> "We're at exactly the same stage with FDDI over twisted pair that we were with 10BaseT three years ago."

Michael Welts
Marketing manager
Cabletron Systems, Inc.
East Rochester, N.H.

Netnotes

3Com Corp. recently reduced the price of its EtherLink II Ethernet LAN adapter by 17%.

The company dropped the price from $345 to $295 in single-unit quantities and from $295 to $245 in five-unit quantities.

EtherLink II, the company's largest selling Ethernet interface, is an 8-bit board for Industry Standard Architecture personal computers.

For more information, contact 3Com at 3165 Kifer Road, Santa Clara, Calif. 95052, or call (408) 764-5000.

Standard Microsystems Corp.'s (SMC) Systems Products Division will announce at Comdex/Fall '90 in Las Vegas this week two new Ethernet adapters for Micro Channel Architecture personal computers.

The two new adapters are the SMC3016TP/MC, a 16-bit 10BaseT interface that supports Ethernet over unshielded twisted-pair cabling, and the SMC3016/MC, a 16-bit board for thick or thin Ethernet cable.

Both interfaces are available now for $450 each.

For more information, contact SMC at 35 Marcus Blvd., Hauppauge, N.Y. 11788, or call (516) 273-3100.

DMA and **Novell, Inc.** announced today that DMA now provides its pcAnywhere IV/LAN remote access product as an upgrade path for users of Novell's discontinued NetWare AnyWare product.

The pcAnywhere IV/LAN is a remote computing and asynchronous communications software package that enables

(continued on page 23)

U.S. bridge/router shipments by protocol

Number of units shipped in:	1990	1991	1992	1993	1994
Apple Computer, Inc. AppleTalk	1,620	1,350	1,480	850	750
Digital Equipment Corp. DECnet	8,090	4,720	2,970	2,540	1,690
Novell, Inc. IPX	5,390	6,920	7,870	9,130	10,370
TCP/IP	14,020	15,520	13,360	10,140	6,800
IBM NETBEUI	540	1,350	2,230	3,380	3,770
OSI	540	4,050	5,940	7,610	9,430
IBM SNA	0	0	740	3,380	7,550
Multiple	22,640	32,570	38,970	47,110	53,760
Other	1,080	1,010	670	380	190
Total	53,920	67,490	74,230	84,520	94,310

Except for the multiple category, current and projected figures denote bridge/routers that can support multiple protocols but are running only a single protocol.

IPX = Internetwork Packet Exchange
NETBEUI = NETBIOS Extended User Interface

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

AT&T's new StarServer S can support 64 LAN clients

Single-80486 machine rounds out StarServer line.

By Tom Smith
Senior Writer

MORRISTOWN, N.J. — AT&T Computer Systems last week announced an Intel Corp. 33-MHz 80486-based computer that can function as a local-area network server, a multiuser system or both.

The StarServer S is a lower end version of AT&T's multiprocessor 80486, the StarServer E, but provides enough processing power and storage to support as many as 64 client workstations.

The StarServer S, based on an Extended Industry Standard Architecture (EISA) bus, supports Unix, AT&T's StarGroup LAN Manager Server and Novell, Inc.'s NetWare operating systems.

The product will compete with other single-processor 80486 servers, such as high-end Personal System/2 models recently introduced by IBM (IBM offers PS/2 as high-end LAN server," *NW*, Nov. 5). In addition, the new server will compete with products from AST Research, Inc., Hewlett-Packard Co. and NCR Corp., AT&T said.

> The product will compete with other single-processor 80486 servers.

▲▲▲

The EISA bus has 10 expansion slots, four of which can optionally support ISA boards. One of the 10 slots is required for a Small Computer Systems Interface (SCSI) controller that can support as many as seven SCSI devices.

StarServer S supports up to 36G bytes of storage on SCSI-attached devices. In two base configurations, the server is shipped with 300M and 600M bytes of SCSI disk capacity.

> The EISA bus has 10 expansion slots, four of which can optionally support ISA boards.

▲▲▲

Located on the system board with the 80486 microprocessor is 4M bytes of random-access memory, expandable to 64M bytes. The board has a 128K-byte cache.

The system is capable of supporting 64 Ethernet or token-ring LAN clients. The high-end StarServer E in a single-processor configuration, by contrast, supports a maximum of 200 LAN clients. When configured as a multiuser system, the StarServer S can support between 32 and 80 asynchronous terminal users. If used in a hybrid environment, it can support as many as 32 LAN clients and 48 terminal users.

StarServer S is available now. It has two base configurations: One supports 300M bytes of SCSI disk storage and costs $14,995; the other supports 600M bytes of SCSI and costs $17,995. ◼

Proposed groups eye alternate FDDI media

ANSI approval would authorize groups to extend FDDI media spec to low-cost fiber, twisted pair.

By Tom Smith
Senior Writer

ANSI, which oversees development of the Fiber Distributed Data Interface standard in the U.S., is mulling the formation of two new working groups to write specifications for running FDDI over twisted-pair or low-cost fiber media.

Should ANSI establish the two groups, vendors will develop lower cost FDDI hardware based on extensions to the FDDI standard, enabling users to support FDDI over existing wiring or install low-cost fiber equipment.

Use of twisted-pair cabling or an as yet unspecified type of low-cost fiber would require development of new transceivers for FDDI connections to the desktop; FDDI backbones would still be composed of traditional fiber at distances up to two kilometers.

Following a mid-October meeting of the X3T9.5 working group for FDDI, an ad-hoc working group proposed that ANSI charter a committee to write a specification for running FDDI over twisted-pair cabling.

The first two vendors to demonstrate support for a twisted-pair FDDI specification were Chipcom Corp. and SynOptics Communications, Inc. ("SynOptics supports FDDI over shielded twisted-pair," *NW*, June 18). Chipcom today can support FDDI running over shielded and unshielded twisted pair, while SynOptics supports shielded twisted pair only.

Given its increasing deployment, unshielded twisted-pair support is probably more important, vendors and users agreed. "But a solution to operate on unshielded twisted pair could well be more complex and costly, mainly because of high attenuation and cross talk," said Peter Tarrant, product manager for connectivity at SynOptics.

Chipcom, for example, said its technology currently supports maximum cable runs of 50 meters from the wiring closet to a desktop device when running FDDI over unshielded twisted pair, whereas the current limit for shielded twisted pair is roughly 100 meters.

Unshielded twisted-pair also

(continued on page 22)

FDDI alternative media backers

- BICC Data Networks, Inc.
- Cabletron Systems, Inc.
- Chipcom Corp.
- David Systems, Inc.
- Digital Equipment Corp.*
- Fibermux Corp.
- Fibronics International, Inc.
- IBM*
- Proteon, Inc.*
- Synernetics, Inc.
- SynOptics Communications, Inc.
- Ungermann-Bass, Inc.

*These vendors said it is premature for them to announce support for alternative media types, but they have participated in meetings.

GRAPHIC BY SUSAN J. CHAMPENY

Epoch software increases LAN storage capabilities

WESTBOROUGH, Mass. — Epoch Systems, Inc. recently announced two software products designed to enhance storage capabilities for users of Sun Microsystems, Inc. Unix-based workstations on Ethernet local-area networks.

The two products, Renaissance InfiniteStorage and Renaissance Backup, are both based on a client/server architecture. Their components run on client workstations and an Epoch-1 server, which stores LAN data using optical and magnetic media and supports from 20G bytes to 1T bytes.

Renaissance InfiniteStorage automates file management tasks by assigning files to an individual user's hard disk or to an Epoch-1 server, depending on the frequency with which those files are used and the amount of available disk storage on the workstation.

As workstation disks fill up, the software automatically scans them and transfers seldom-used files to the Epoch-1 server, where a user can access them in the future if necessary.

The user's most active files remain on local disks for optimal response time. In either scenario,

(continued on page 22)

Proposed groups eye FDDI media

continued from page 21

does not offer the level of security inherent in FDDI local-area networks, but that fact is less likely to hinder its acceptance, according to David Fowler, vice-president of marketing at Chipcom. "That's the way 60% of the market is going for Ethernet today," he said.

Any twisted-pair FDDI specification would merely be an interim step that would make FDDI evaluations more cost-effective, Fowler said. "If I could use a wiring system that's already in place and prove that, in fact, FDDI is going to benefit me, I may go out and buy the equipment," he said.

In addition to twisted pair, ANSI X3 is weighing another ad-hoc group's proposal to establish a committee to write a low-cost fiber FDDI specification.

The proposed specification would define a media type that supports shorter cabling runs from the wiring hub to desktops than the current FDDI specification allows.

By shortening the maximum allowable distance between a hub and end nodes, vendors would be able to build lower cost FDDI components, according to Bruce McClure, chairman of Synernetics, Inc., an FDDI vendor in Billerica, Mass., and chairman of the group that drew up the proposal for a low-cost fiber work group.

This could be done on plastic fiber or the glass fiber-optic cable in use today, McClure said, but the proposal does not include a specific type of fiber.

Despite the shorter distances supported by the two proposed media, many contend that a 100-meter distance capability is adequate for the needs of most users.

Approximately 98% of end-user workstations are located within 245 feet, or roughly 75 meters, of a wiring closet, said Bill Spina, vice-president of Information Transport Systems, Inc. (ITS), a Burlington, Mass.-based firm that specializes in the design and installation of communications cabling systems. ITS arrived at these figures from a survey of 80 users.

For example, Microsoft Corp., a large FDDI user, locates the majority of its users no more than 80 meters from a wiring closet, said Dave Leinweber, manager of LAN administration for the Redmond, Wash.-based software giant.

Microsoft has not implemented FDDI to the desktop in its campus network, which has 22 bridged connections to the FDDI backbone, because a single FDDI connection costs as much as $8,000, Leinweber said. "We are very interested in seeing FDDI get out onto lower cost media" that would reduce the connection cost to between $1,500 and $2,500, he said. "We think twisted pair has the potential to bring it down into that range."

The current 50-meter distance limitation of unshielded twisted-pair FDDI today would prevent it from being used in the University of Pittsburgh's FDDI backbone, which supports more than 70 LANs, according to Bill Fithen, manager of network planning at the university.

The typical distance in the university's network, Fithen said, is closer to 250 feet. "I'm sure there are places where those distance limitations will be acceptable, but I think, in most cases, they are not going to be practical."

The university would have some interest in plastic fiber because cable terminations are performed by university staff, and plastic is faster and easier to terminate, Fithen said.

McClure said the X3 committee will likely decide on formation of the work groups by the time of X3T9.5's next meeting in December. ◪

Software ups storage capabilities

continued from page 21

the user does not need to know where the file is stored; the retrieval process is transparent.

A network administrator can determine when the tasks take place, but in general, they will be performed at off-peak hours to minimize any impact on the network, according to Chuck Holland, vice-president of marketing at Epoch, based here.

> Renaissance Backup lets any Sun workstation user automatically back up data to the Epoch-1.
>
> ▲▲▲

Software running on the Epoch-1 server has been enhanced to support the client software.

Renaissance InfiniteStorage ranges in price from $1,500 to $15,000, depending on the Sun workstation platforms on which it runs.

It will be available 90 days after receipt of order.

The other software package, Renaissance Backup, enables a user from any Sun workstation on the LAN to automatically back up data stored on that workstation to the Epoch-1 server.

In the past, users that wanted to back up workstation data to the Epoch-1 server needed to transfer a file from the workstation, across the Ethernet and to the server, where it was then archived.

Now users store the file and the software automatically writes a copy of it to the Epoch-1.

An on-line backup catalog is also created that describes the location and backup history of each file. The process reduces operator involvement and runs without disrupting the user.

Epoch's Renaissance Backup will be available in the first quarter of 1991.

Pricing for the software has not yet been determined.

In the future, Epoch will offer these software packages for other Unix-based hardware platforms, including those from Hewlett-Packard Co., MIPS Computer Systems, Inc. and other vendors whose products are used by Epoch customers. ◪

It's the fastest
But it will never cat

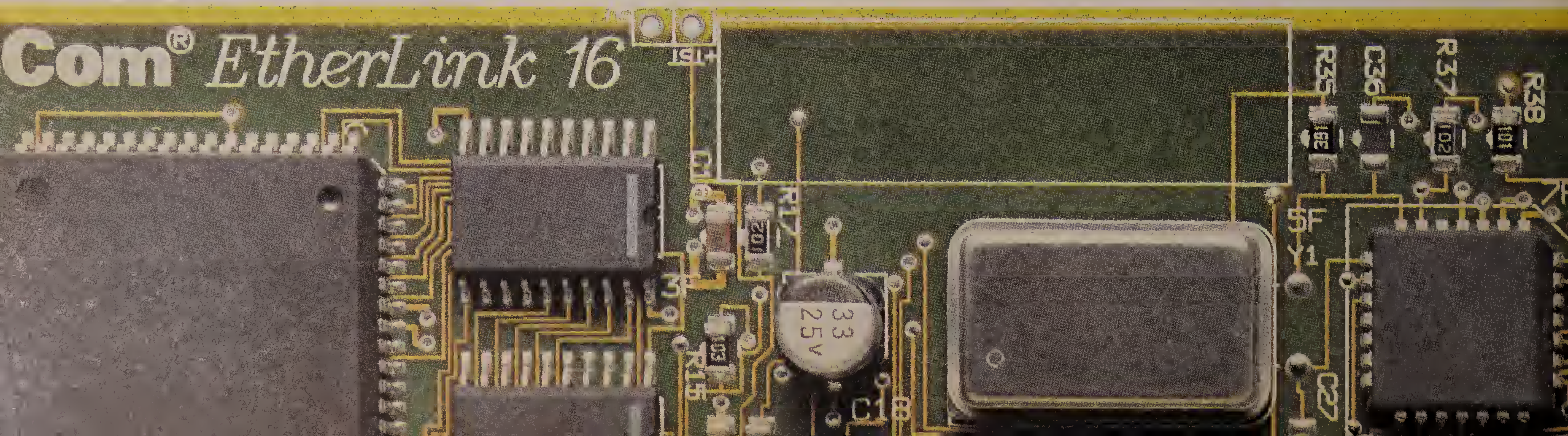
You can go fast. You can go safe. Just not together. Until EtherLink® 16.

This 16-bit Ethernet network adapter is up to 90 percent faster than its major competitors.* Yet it runs with a lifetime warranty.

You can use it with your IBM PC, XT, AT, PS/2 Model 25 or 30 and compatibles, as well as EISA computers. And it's ready to run on NetWare, LAN Manager and 3Com® 3+Open.™

What's more, EtherLink 16 is speedy to install,

*An independent laboratory, LanQuest Group, did the testing, and you can get a copy of their glowing report on speed by calling us at 1-800-NET-3Com. You can also request the data on reliability, and learn why that of two million 3Com adapters in use, 99.5 percent have never needed repair.



Netnotes

continued from page 21

one personal computer to remotely control a host personal computer across a network via a modem connection.

Personal computers that do not reside on the local-area network can access network services, applications and data on a LAN as if they were locally attached to it.

Besides remote computing, other features supported by the software include Digital Equipment Corp. VT-220 terminal emulation, Xmodem file transfer, background file transfer and a scripting language to automate frequently used functions.

Current users of NetWare AnyWare can upgrade to pcAnywhere IV/LAN for $99, which includes a license for four LAN nodes and documentation.

For more information, contact DMA at 1776 E. Jericho Turnpike, Huntington, N.Y. 11742, or call (516) 462-0440.

Novell, Inc. recently announced that it has certified two new IBM Personal System/2 Micro Channel Architecture computers for use as high-performance servers or workstations with NetWare 386, System Fault Tolerant and Advanced NetWare Version 2.15.

The two new IBM platforms that have been certified are the PS/2 Model 90 XP 486 and the PS/2 Model 95 XP 486, which were introduced Oct. 30.

As part of this compatibility, the two firms also announced certification of IBM Ethernet, Token-Ring and Small Computer System Interface controllers used with the two new PS/2s.

In a related development, Novell announced a new version of its NetWare Requester for OS/2, which allows workstations running IBM's recently introduced OS/2 Version 1.3 to access NetWare services.

Specifically, NetWare Requester for OS/2 Version 1.3 gives users transparent access to NetWare's file, print, data base and communications services, as well as comprehensive fault tolerance, security and resource accounting.

NetWare Requester for OS/2 Version 1.3 includes full support for all OS/2 application program interfaces, including the Named Pipes interprocess communications facility.

For more information, contact Novell at 122 E. 1700 S., Provo, Utah 84606, or call (801) 429-7000.

National Semiconductor Corp.'s Computer Enhancement Group recently announced it has begun shipping drivers for Network Basic I/O System and Microsoft Corp.'s Network Driver Interface Specification (NDIS) with its 16-bit Industry Standard Architecture Ethernet adapter boards.

NDIS allows the adapter card to support Microsoft's OS/2 LAN Manager as well as all OEM versions of the network operating system.

National Semiconductor is now bundling the two drivers with all of its new EtherNode* 16AT adapters. Existing users can receive a free upgrade by calling the company's bulletin board at (404) 551-1012.

Network Computing Devices, Inc. (NCD) last week introduced a low-cost, 15-in. monochrome X Window System terminal. Priced at $1,495, the new NCD15b provides the functionality of larger color X Window terminals. NCD's existing 16-, 17- and 19-in. terminals, for example, range in price from $2,295 to $5,000.

The product is the second in NCD's new line of entry-level X Window terminals, which use a gate array chip designed by the company. NCD15b will be available 30 days after receipt of order.

For more information, contact NCD at 350 N. Bernardo Ave., Mountain View, Calif. 94043, or call (415) 694-0650.

The **Local Area Network Dealers Association (LANDA)** is preparing for its LANDEX '91 conference to be held Jan. 17-19 at the Hyatt Regency in Irvine, Calif.

Technology issues slated to be discussed include high-performance LAN topologies, Intel Corp. 80386-based communications topics and facsimile/electronic mail gateways.

For more information about the meeting, contact LANDA at 360 W. Butterfield Road, Suite 260, Elmhurst, Ill. 60126, or call (708) 279-2255.

Madge Networks, Inc. of San Jose, Calif., recently announced it has signed an agreement with **Westcon, Inc.** to distribute Madge's entire line of token-ring local-area network products. Madge also has a distribution pact with Tech Data Corp. of Clearwater, Fla.

Madge's line of token-ring products will complement Westcon's Ethernet and Arcnet products that include hardware, software, diagnostics and management tools.

Madge's products include token-ring interface boards for Industry Standard Architecture, Extended Industry Standard Architecture and Micro Channel Architecture personal computers, a repeater, token-ring media access units and token-ring management software.

Headquartered in Eastchester, N.Y., Westcon is a local-area network distributor and education center.

Hayes Microcomputer Products, Inc. recently enhanced its Smartcom Exec 2.0 asynchronous communications software package with support for local-area networks.

Smartcom Exec 2.0, which runs on a LAN server, supports the sharing of either a single modem or multiple modems. Version 1.0 of the product worked only in stand-alone environments.

The software, which will be available in mid-January, will cost $129. Existing users can receive a free upgrade.

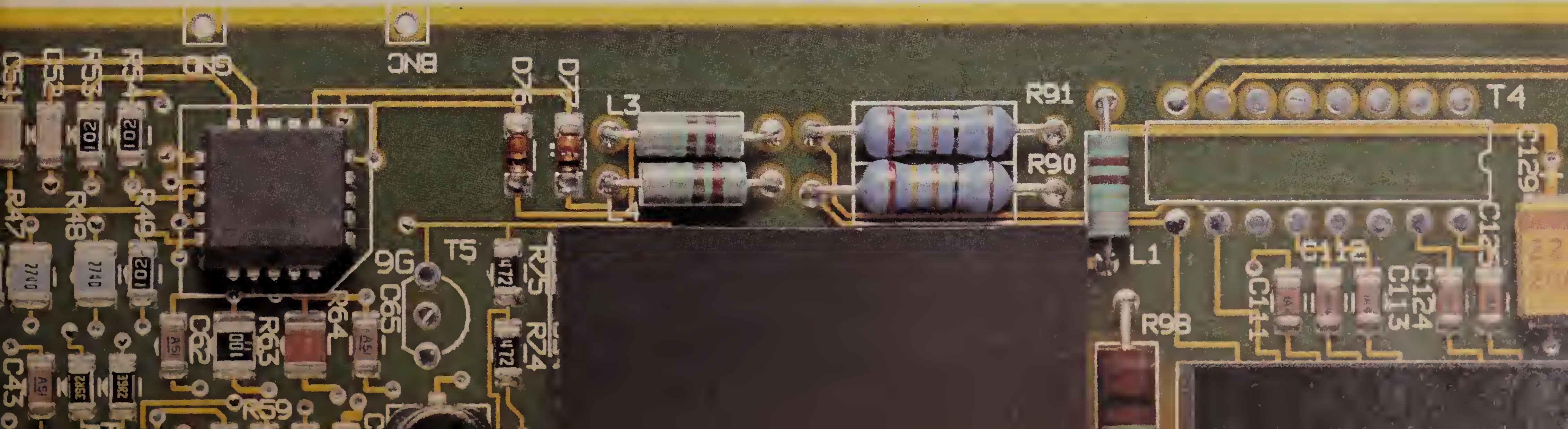
For more information, contact Hayes at P.O. Box 105203, Atlanta, Ga. 30348, or call (404) 449-8791. ◼

board available.
ch up to its warranty.

because there are no jumpers to slow you down.
But why not see for yourself?
Just call **1-800-NET-3Com** Dept. D6556 for the
name of your nearest 3Com reseller.

3Com®
We network more types of systems
to more types of systems.™

©1990 3Com Corporation, 5400 Bayfront Plaza, Santa Clara, CA 95052. Telephone (408) 764-5000. 3Com, 3+Open, EtherLink and the 3Com tagline are trademarks of 3Com Corporation. IBM, XT, AT and PS/2 are trademarks of International Business Machines Corporation. NetWare is a registered trademark of Novell, Inc. LanQuest is a trademark of LanQuest Group.



If
you've tried
to connect your
Novell® LAN to the
corporate network
and ended up
just seeing red..

We need to talk.

When you want to combine the services of your LAN with resources on your corporate network, it's time to call Wollongong.

As you've probably discovered, most corporate networks include several different operating systems, often with proprietary hardware and software.

Only Wollongong has the software products that connect all these dissimilar resources, because we base our solutions on open systems standards.

Only Wollongong lets you preserve your past investments, extend your existing systems, and guarantee the flexibility of your network for the future.

In fact, for over 10 years, we've been helping Fortune 500 companies build corporate networks in multi-vendor environments.

So now, when you visualize the future of your corporate network, there's no reason to just see red.

Call 1-800-872-8649 (in California 1-800-962-8649) or write The Wollongong Group, Inc. 1129 San Antonio Road, Palo Alto, CA 94303.

When you need to network, we need to talk.

WOLLONGONG

The leader in multi-vendor networking.SM

© 1990, The Wollongong Group, Inc. All other product names are trademarks of their respective manufacturers.

TO APPRECIATE WHAT YOU STAND TO GAIN FROM RACALAN NETEXPRESS,™ CONSIDER WHAT YOU STAND TO LOSE.

To join local area networks together, LAN administrators have traditionally relied on bridges, routers, repeaters, gateways, and enough wires to give birth to a small electric company.

This arrangement didn't make for the most efficient of systems. It was expensive. Impossible to reconfigure. And it created more bottlenecks than the LA Freeway.

RACALAN NETEXPRESS

A software-configurable, RISC-based internetworking system.

Still, it was the best available solution. Notice we said "was." Because now there's RACALAN NetExpress.™

RACALAN NetExpress combines the best capabilities of routers, local and remote bridges, and repeaters in a single, cost-effective system.

Because RACALAN NetExpress is the first product of its kind to utilize RISC-based architecture, its performance is unsurpassed—up to 30 times the processing power of typical bridging and routing equipment. RACALAN NetExpress provides fast packet switching, comprehensive filtering and forwarding operations, and it pushes data at an unheard-of 75,000 packets per second. And, it's completely software configurable.

Best of all, RACALAN NetExpress comes from a global company with $3 billion in revenue and a unique ability to interconnect local and wide area networks. From modems and fiber optics to digital T1, VSAT networks and now RACALAN NetExpress, we have the products and expertise to make networking work for you.

If your interest is sufficiently aroused, we invite you to phone **1-800-RACAL-55 (in Florida, 305-846-4811).**

The only thing you have to lose are things you really ought to lose. Reseller inquiries invited.

RACAL
Racal-Milgo®

WE UNDERSTAND NETWORKING INSIDE AND OUT.™

©1990 Racal Data Communications, Inc. All rights reserved.

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USERS GROUPS AND ASSOCIATIONS

Dialogue

What steps is your firm taking to prevent being cheated by private branch exchange fraud?

“We got rid of our remote access option, and I think that’s kept a lot of crooks out of our system since remote access is one of the easiest ways to defraud a company’s PBX.

“We always felt [remote access] was open to abuse, and there were enough fraud attempts when we did have it, so we opted to remove that option and issue discount calling cards for employees instead.”

Michael Taussig
Assistant director of corporate
telecommunications
Colgate-Palmolive Co.
New York

“We’ve removed remote access from our PBX, and that eliminates a lot of potential fraud. We’ve also removed the 900 area code — or pay per call — from all of our sites to reduce fraud from the inside.

“We found we were getting hit with a lot of charges made to the 900 area code. As far as we could determine, there were no legitimate business calls that could be made to that exchange, and employees were using company money to make calls to sports lines, astrologers and the like. So we’ve put a stop to that fraud too.”

Charles Aldred
Telecommunications supervisor
Philadelphia Electric Co.
Philadelphia

“We used to have remote access on our PBX, but we removed it because it was so vulnerable to fraud. Any good hacker can break into a PBX security code since they usually consist of only four to seven digits. We also refuse collect calls and third-party billings to help cut down on fraud, and we’ve placed restrictions on calls made to the 900, 700 and 976 area codes.”

Constance Verner
Regional
telecommunications manager
Midlantic Corp.
Edison, N.J.

Network World *invites users to respond to future “Dialogue” questions through our Bulletin Board System (BBS). For information on how to access the BBS, see the Table of Contents on page 2.*

Study claims demands on IS execs create mgmt. gap

Top managers are spread too thin to be effective.

By Wayne Eckerson
Senior Editor

CHICAGO — A new study says many large companies suffer from a leadership gap caused by information systems (IS) managers who are being spread too thin to do an effective job addressing a growing number of business, technology and human resource issues.

IS directors are assuming broader leadership positions within their companies and, as a result, are being asked to fill multiple roles and address more nontechnology issues than ever before, according to the study, which was conducted by Andersen Consulting, located here.

While IS managers once focused primarily on technology, today, they must be businesspeople, strategists, educators and communicators, the report said.

“With the number and scope of issues growing, it is not surprising that IS executives and their companies have been unable to master all [of those positions],” the report stated. “Clearly, the challenge for IS executives in the 1990s is to master a new range of issues and close the leadership gap.”

Called “The Changing Shape of IS: Redefining Technology Leadership,” the study includes interviews with 125 IS managers at firms with more than $500 million in annual revenue. Andersen Consulting conducted similar studies in 1986 and 1988.

The study identified a group of key IS-related issues that IS executives ranked high in importance to their companies but said were being ineffectively addressed.

They include: encouraging line managers to employ information technology to reshape business processes; training and educating employees to use information technology; developing a quick response capability to handle changing business opportunities; and integrating information technology into corporate strategy.

Most of these issues are new to IS managers since the last Andersen Consulting study two years ago and reflect the fact that IS executives are being forced to address a broader range of business

(continued on page 30)

GUIDELINES

BY ERIC SCHMALL

Knack for politics a must for successful managers

Communications managers inherit voice and data networks comprising a mottled assembly of competing vendors’ equipment, a polyglot of protocols and a maze of physical and logical paths.

These crazy-quilt systems are, quite often, the product of political battles within an organization — squabbles over who would make the decision, who was in control and who wanted to play the role of nonconformist — rather than any single technology-related issue.

Consequently, communications managers must move nimbly among the complex assembly of actors within an organization to marshal some order in a world where parochial self-interests and conflicts among executives work against sound recommendations.

Managers must become familiar with how organizational politics are ordered. They must know who is allied with whom, what are staffers’ principal concerns and where do they feel vulnerable. This information allows communications managers to act much more effectively in garnering support for projects. They can anticipate where they will encounter political roadblocks and start working toward overcoming them early on.

Managers, for instance, may find themselves in a peculiar situation when attempting to obtain approval for a new private branch exchange. There may be very compelling reasons to

(continued on page 31)

Schmall is a network systems manager for an insurance holding company.

Greyhound buses roll on despite company’s Chapter 11 filing.

Net exec details ups, downs of Chapter 11

Greyhound’s Sharon Heinle offers caveats for network managers facing company bankruptcy.

By Wayne Eckerson
Senior Editor

DALLAS — When Greyhound Lines, Inc. filed for bankruptcy last June after a bitter and sometimes violent strike by bus drivers, network manager Sharon Heinle knew she was in for the roller coaster ride of her career.

Now five months later and with Greyhound running at almost full capacity, Heinle said many positive lessons emerged from the crisis, despite long hours and a host of frustrations.

“We’ve all grown personally and professionally,” said Heinle, who is director of voice systems for Greyhound, which is scheduled to present a reorganization plan before federal bankruptcy court next week.

Heinle said the Chapter 11 bankruptcy filing brought the firm’s voice and data groups closer together. The groups, which previously worked independently and distrusted each other, established a standard for wiring new offices and agreed on a division of responsibility for carrying out the work.

“We are now speaking to each other more openly,” Heinle said. “Instead of hiding our differences of opinion, we now address and resolve them.”

In addition, the two groups learned to make sound decisions quickly. Shortly after the June 4 Chapter 11 filing, top executives moved the corporate staff from expensive office space in downtown Dallas to four locations outside the city, where rent was significantly lower.

This move required Greyhound’s voice and data groups to team up to equip the new locations with phone systems and T-1 access to the company’s data center in Des Moines, Iowa.

“We had to do things in 60 days that should have taken six months to plan and six months to implement,” Heinle said. “It kept us from studying the thing to death.”

Currently, Heinle is working with Greyhound field managers, who manage the operations of more than 5,000 Greyhound bus terminals across the U.S., to optimize phone service in an effort to reduce expenses.

In most cases, Heinle said she is swapping out dedicated 800 numbers or WATS services for comparable switched services, such as switched 800 services.

Heinle said positive lessons emerged from the crisis, despite long hours and frustrations.

▲▲▲

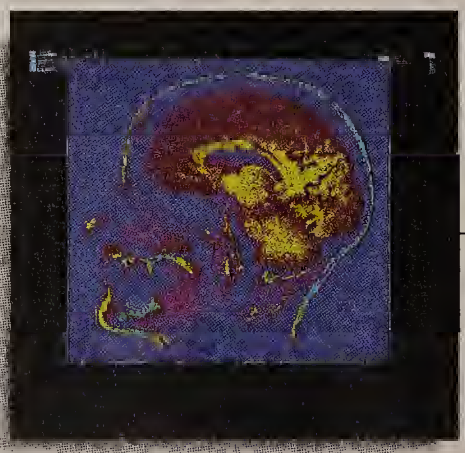
Last year, Greyhound signed a three-year, $18 million contract with US Sprint Communications Co. for its Virtual Private Network service.

“Before the bankruptcy, we were planning to address one office a week, but now we are doing three or four a week,” she said.

Heinle said the most frustrating aspect of having her company declare bankruptcy was dealing with local carriers. She said she was bombarded with calls from local exchange carrier field representatives who wanted to know why Greyhound was not paying its bills. Many also threatened to disconnect service.

(continued on page 30)

Now send 10 times more data every second with Digital's Ethernet and FDDI solution.



Ethernet 10 Mb/sec.

©Digital Equipment Corporation, 1990. The DIGITAL Logo, DECbridge, DECconcentrator, DEC FDDIcontroller, DECstation, DECelms, DECnet and Digital has it now are trademarks of Digital Equipment Corporation.
Integrated Image Management graphics generated by SMS.

digital™

Digital has a way to put Ethernet in a whole new light.

Just look into Digital's complete line of FDDI fiber-optic networking products. And get ready to see throughput improve between Ethernet LANs by a power of 10.

The best Ethernet solution made even better.

802.3/Ethernet is the most widely used LAN technology in all the land. And Digital has been Ethernet's leading innovator for as long as there's been an Ethernet.

But now, with our complete FDDI solution, the best in LANs just got better.

FDDI. The cure for LAN-locked data.

FDDI is the fiber-optic standard that sets new standards for performance. Offering data rates of up to 100 Mb/sec.

With Digital's complete line of FDDI and Ethernet products, you can network workstations, servers and storage devices for fast, reliable performance. Our DECbridge™ 500 interconnects an 802.3/Ethernet and a high-speed 100Mb/sec. FDDI network backbone. The DECconcentrator™ 500, a modular, fully manageable hub, attaches FDDI devices, like workstations and bridges, to the primary backbone ring. Our DEC FDDIcontroller™ 700 is the high-performance FDDI controller for DECstation™ 5000s. And, DECelms™ is the software that lets you manage extended LANs, both Ethernet and FDDI, with just one management product.

And now for the complete picture.

Digital's FDDI products are the perfect solution for network-intensive, high-bandwidth applications like graphics, compound documents, high-speed access to distributed databases, and imaging—for example, the Integrated Image Management system from SMS shown in this ad.

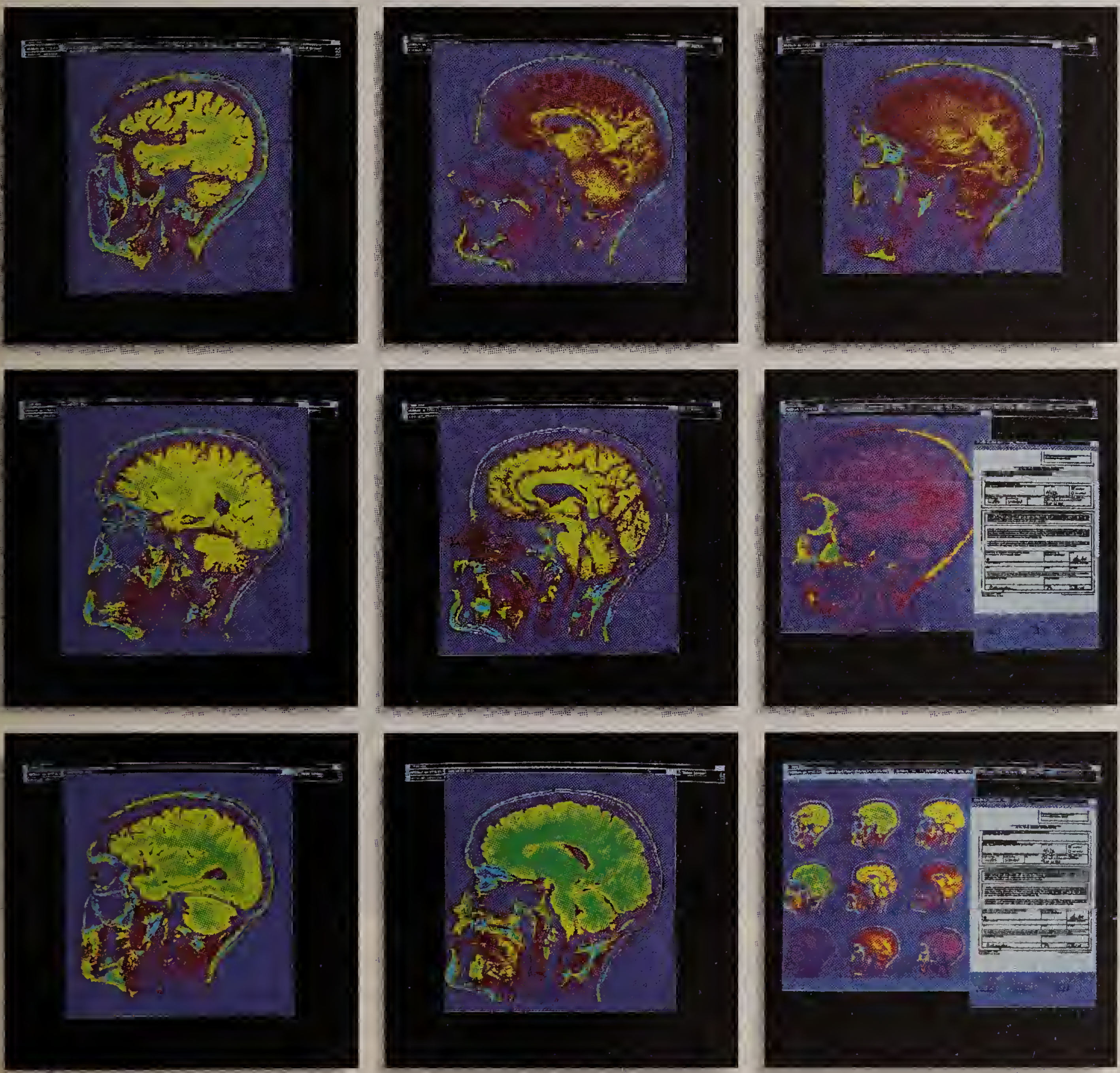
Our Ethernet/FDDI solution supports any workstations or computer systems that comply with DECnet™, OSI or TCP/IP networking standards. And our Ethernet/FDDI solutions serve as the foundation for Digital's ground-breaking Network Application Support (NAS), a comprehensive set of software that enables applications integration across a distributed multi-vendor environment. When you build network applications using NAS, you can be assured of long-term stability and compatibility, even as new technology evolves.

The performance leader in open networks.

Our new FDDI products are just one example of Digital's leadership in networking. With our tradition of technological innovation, intelligent network management and a steadfast commitment to open standards, Digital's networking gives you a way to tie your company together, without tying you down.

For more information, call your local Digital sales office.

Digital
has
it
now.



Digital's Ethernet/FDDI, 100 Mb/sec.

Survey finds large users rely on net equipment vendor for support

By Wayne Eckerson
Senior Editor

LEXINGTON, Mass. — Large companies are more likely to turn to network equipment vendors for support services than other types of vendors, including systems integrators, local carriers and computer suppliers, according to a new survey.

The report found that 80% of respondents use network equipment vendors to provide support services, ranging from maintenance and repair to network planning, integration and outsourcing.

Researched and written by The Ledgeway Group, a market research and consulting firm based here, the report was based on interviews with 500 information systems (IS) and network managers from Fortune 1,000 firms, government agencies and nonprofit organizations.

Following network equipment vendors, users are most likely to turn to computer vendors for support services, the report stated.

According to the study, "Network/Communications Support: User Wants and Needs," users are least likely to use local carriers and systems integrators for support services.

Other findings of the study include:

- Network users consider multivendor integration the most important network support service a vendor can provide.
- Companies are generally satisfied with the level of network support they receive.
- Large companies are reducing spending on network support services in their IS or network budgets. On the other hand, small and midsize companies are increasing such spending.
- The IS or network manager is most likely to initiate discussions with an outsourcing vendor, while the chief executive officer usually makes the final decision on whether to outsource. ◘

Net exec details ups, downs of Chapter 11

continued from page 27

Unfortunately, many of the local exchange carriers failed to advise their field representatives about how to deal with companies that have filed Chapter 11, Heinle said.

Many carrier representatives didn't know that the local phone company, as a regulated utility, isn't allowed to discontinue service for nonpayment of services rendered prior to the date a company files for Chapter 11, Heinle said.

To reduce confusion, Greyhound set up an 800 number that carriers and other Greyhound creditors could use to obtain information about how to submit claims to

Demands on IS execs create mgmt. gap

continued from page 27

and human resource questions than ever before, the study stated.

However, the study also showed that many IS executives believe they are managing certain aspects of their jobs well. The executives surveyed said they are doing a good job communicating the strategic benefits of technology to senior executives, line managers and end users, and they are successfully managing information resources such as corporate data bases. Many also said they were succeeding in staying abreast of technology.

As the roles of IS executives broaden, these managers are assuming more visible leadership positions within their companies. According to the study, IS executives now view themselves as businesspeople whose primary responsibility is to communicate the benefits and potential of IS to others in their company.

Of those interviewed, 87% agreed that they view themselves as a business person first and an IS professional second.

In addition, 93% agreed that it's important for them to effectively communicate the business implications of technological developments, and 94% said they serve as an educator and communicator within their companies.

While IS executives agreed about their roles as business leaders, they were divided about the single most important issue facing them in the next three to five years.

Although executives mentioned many issues, no one concern dominated the group. Only four issues were mentioned by at least 10% of those interviewed.

Of those, 13% said adapting or integrating technology to meet business needs would be the focus of their efforts in the next three to five years. Other issues mentioned were cost cutting (12%), integrating dissimilar communications systems (11%) and updating existing systems or purchasing new systems (10%).

The growing number of issues facing IS executives has forced them to fill multiple roles and has made their jobs increasingly complex, the study stated. Successful IS executives need to exercise strong leadership skills, it also said.

"The challenge of the 1990s for most IS executives in major organizations will lie in winning the broader organizational support necessary to make information technology solutions work," the report stated.

"That requires redefining technology leadership in order to blend proven technology skills with those of an executive empowered to lead the organization." ◘

I WANT T3 THAT'S COMPATIBLE WITH WHAT I'VE GOT AND WHERE I'M GOING.

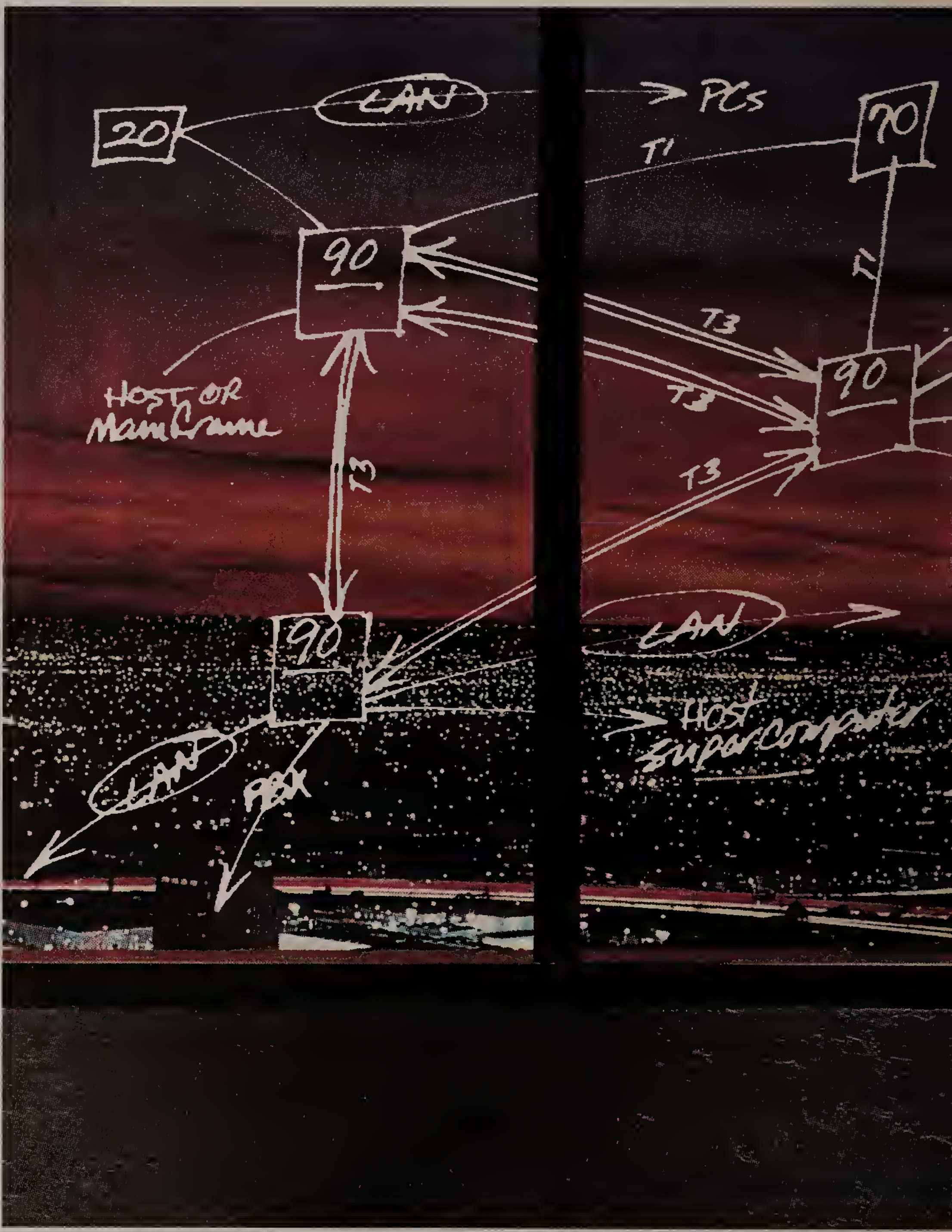
T3 opens up a whole new range of competitive advantages to innovative companies worldwide. It increases access to corporate resources and information. And provides network support for multi-megabit applications like LAN internetworking, shared CAD/CAM information, interactive video, high-speed distributed image and graphics, host-to-host communications, and supercomputer networking.

T3 FOR WHAT YOU HAVE.

You can have all these high-bandwidth advantages, increased transmission savings, and more, with the new IDNX®/90 transmission resource manager from N.E.T. It provides the T3/T1 capabilities you want. Support for image and video. With capabilities for packet mode services and internetworking.

N.E.T. makes it an even better choice with top quality, extensive redundancy and automatic rerouting for the highest reliability. Distributed intelligence for faster reroute, more efficient bandwidth utilization, high applications availability and better control.

The IDNX/90 is also fully compatible with your current IDNX network and management system. You can even field upgrade your existing IDNX/70s directly to 90s.



T3 FOR WHERE YOU'RE GOING.

The IDNX/90 is designed for more flexibility so it can support new standards as they emerge, easily move to new applications, or increase capacity. Our high-performance processor and advanced switching architecture grows with you.

N.E.T. will also help you stay more competitive by providing the latest solutions for broadband networking services and SONET offerings.

We'll support your IDNX

the bankruptcy court to collect payments due before June 4.

In some cases, Heinle even sent a copy of the Chapter 11 filing to skeptical field representatives.

"Once I sent them a copy [of the Chapter 11 filing] and they realized I wasn't trying to pull the wool over their eyes, they were willing to work with me. They filed their claims and cleared their accounts, and now everything is fine," she said.

With long-distance carriers, the process involved examination of hundreds of thousands of dollars in phone bills to determine which charges occurred before the bankruptcy filing.

Those charges occurring prior to June 4 were submitted to bankruptcy court; Greyhound is paying all of the other charges on a regular monthly basis.

At the new location, some of the long-distance carriers asked for up-front deposits to perform services. US Sprint, for example, asked for a deposit before it connected Greyhound's four new corporate locations into the virtual voice network it runs for the bus company.

"Because of the professional relationship we've developed with our carriers, they aren't beating us over the head," Heinle explained. "Business has gone on as usual."

Contingency planning helps

Heinle said it is critical for network managers to establish contingency plans to deal with business emergencies, such as bankruptcies, when outsiders flood telephone lines seeking information.

Network managers should determine in advance exactly how they might establish an 800 number during such crises, Heinle said.

Managers should decide which carrier would provide the service and discuss how it would be employed. They should also determine which group within the company would be most appropriate to handle calls in certain situations, where that group is located and whether they have the staff to support large volumes of inbound calling, Heinle said.

"Just as in disaster planning, you need to decide ahead of time how you are going to respond if all of a sudden there is a big lack of confidence in your company and suppliers start calling," she said. ☒

Knack for politics a must for managers

continued from page 27

purchase the piece of equipment, but the chief financial officer may veto the plan because he's "not quite comfortable with the numbers."

The real reason, however, could be that he was not consulted early enough in the process and wants to teach the communications manager (or the manager's superior, who is typically the vice-president of MIS) a lesson in proper acquisitions procedures.

By letting the communications decision dangle for a while, the chief financial officer demonstrates his power.

Or consider the case of a manager who wants to unify different divisions under a single long-distance carrier for voice services. By pooling all of the divisions' long-distance volumes, the group could request a special discount from the carrier.

While such a plan has potential to reduce costs, division chiefs who may agree in principle with the idea, may very well balk at giving final approval for a variety of unstated reasons. They may not like yielding their independence on this issue, they may be embarrassed that they didn't think of it first, or they may be engaged in some petty personal turf war.

Political savvy

Communications managers rarely possess the requisite power to mandate final decisions, create strategic policies and enforce the rules of information transport. But they possess the necessary wisdom to overcome these types of jurisdictional disputes.

> By letting the decision dangle for a while, the chief financial officer demonstrates his power.
>
> ▲▲▲

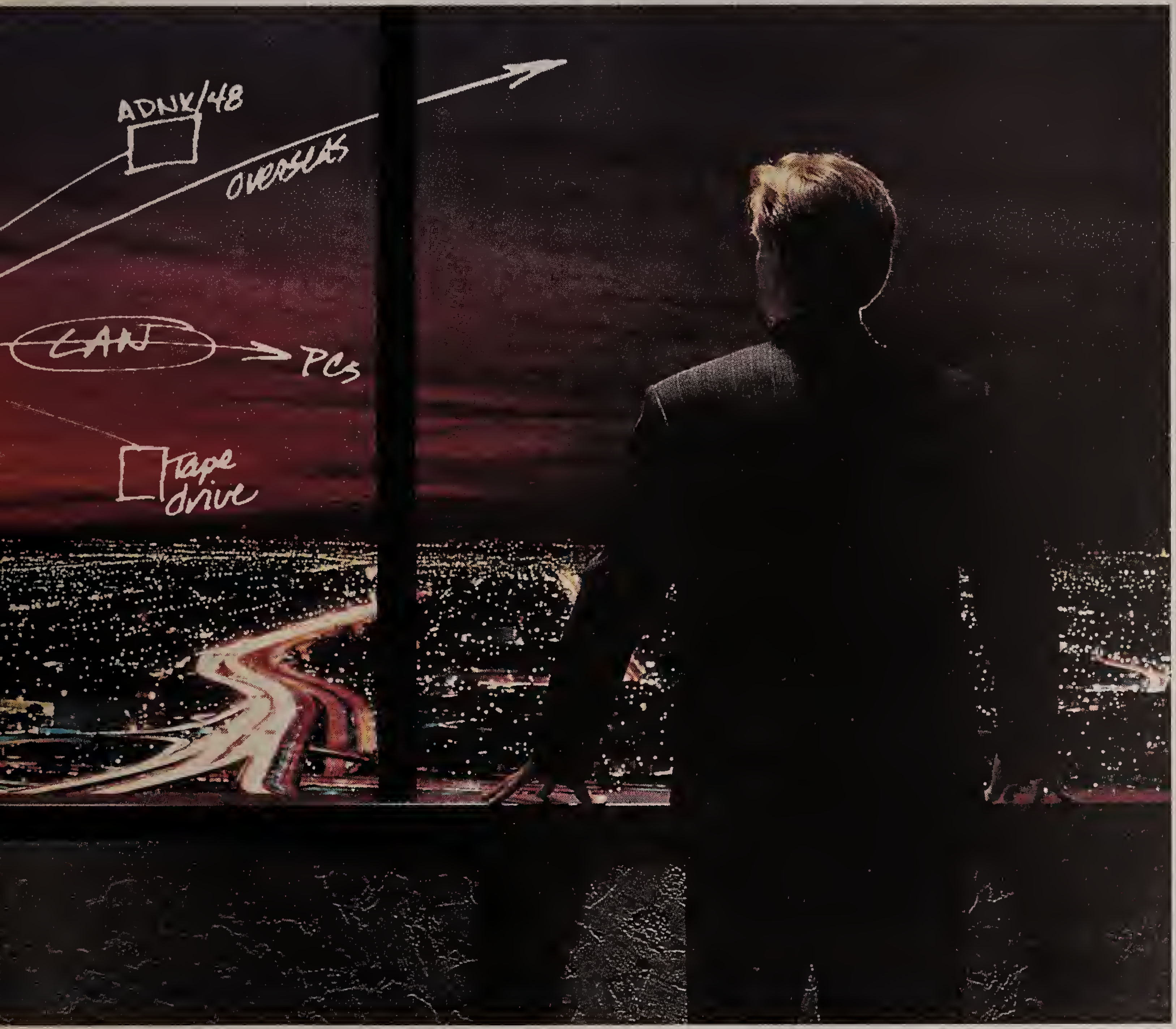
Communications managers, for example, may want to start talking with the chief financial officer's staff very early in a campaign to replace a PBX in order to make sure that staff feels they were present at the conception of the project and that they were in part responsible for the idea's evolution.

Managers may want to organize their efforts to aggregate long-distance usage by appealing to the division chief's competitive spirit. To do this, they should emphasize the potential monetary savings for their individual cost centers, rather than focusing on some general esoteric benefits that don't interest them.

Successful communications management can only be achieved by someone who can integrate new technology within the fabric of an organization. This can never be accomplished by some fiat issued by the communications manager.

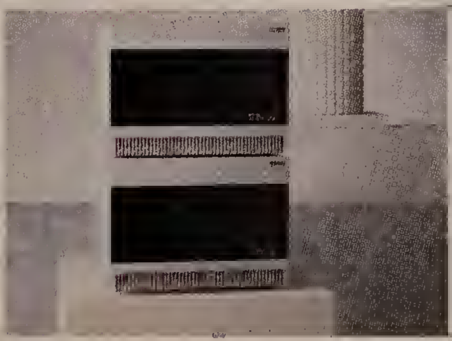
Instead, communications managers should work with and among the powerful and influential members of their organization, recognizing their interrelationships, understanding their needs and appealing to their interests in order to gain the support required to move the group to a rational, ordered communications function. ☒

N.E.T. KNOWS HOW. NETWORK EQUIPMENT TECHNOLOGIES™

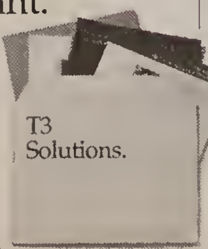


products with local field service engineers and our Technical Assistance Center, which offers 24-hour-a-day hotline service seven days a week.

Move into the future with high-bandwidth networking solutions from N.E.T.



Get the high-bandwidth advantages you want. Call today for product information on the IDNX/90.
1-800-952-6300.
Ask for dept. N1A.



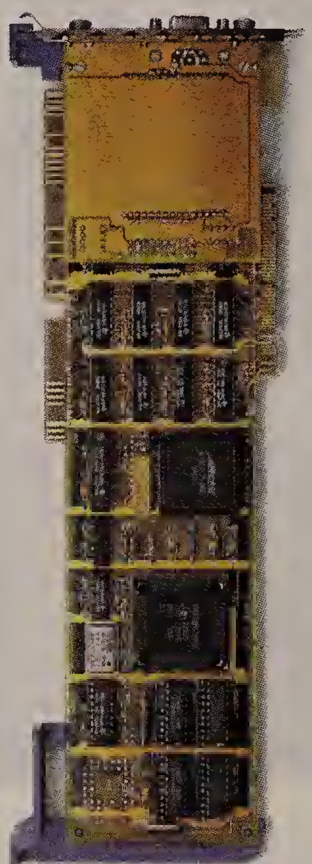
©1990, Network Equipment Technologies, Inc., 800 Saginaw Drive, Redwood City, CA 94063. (415) 366-4400. TLX 172325. European Headquarters: Network Equipment Technologies, Ltd, Manor Court, Manor Royal, Crawley, West Sussex, England RH10 2PY, 011 44 293-552831. N.E.T., Network Equipment Technologies and the N.E.T. logo are trademarks of Network Equipment Technologies, Inc. All other registered and unregistered trademarks are the sole property of their respective companies.

See DCA at Comdex Booth #1016.

IRMAtrac Token-Ring is now shipping.

Sometimes you just need a flexible board.

IRMAtrac. The most flexible token-ring board in the world.



Within the myriad of connectivity options, you need to choose the path or paths that will protect your investment both now and in the future. Which is why we developed IRMAtrac,™ our new, highly flexible token-ring board. IRMAtrac Token-Ring Adapter/Convertible is designed to adapt in three different ways, to cover all of the token-ring growth possibilities that face you.

Whether you're planning to move from twisted pair to fiber optic, 4 MBPS to 16 MBPS, or the standard PC environment to the MCA world of PS/2,® IRMAtrac's flexible architecture and modular design allow you to handle all of these environments.

That way, you can select the path that's right for your business, all the while enjoying the kind of reliability and IBM®compatibility that make DCA's IRMA products so highly successful.

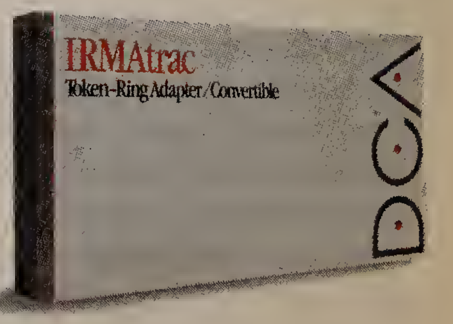
Yet our appeal doesn't stop at flexibility. IRMAtrac offers better performance than IBM's token-ring due to bus-master technology.

And we're compatible with the industry-leading network operating systems, including Novell® Netware® 286 and 386, DCA 10Net,® Microsoft® LAN Manager, 3 + Open,™ IBM LAN Server Program, and IBM PCLAN Program. Plus, other microcomputer architecture versions, such as Macintosh, will be available in the future. Which is highly unlikely from IBM.

In short, IRMAtrac represents the ultimate token-ring connectivity solution.

For more information on IRMAtrac Token-Ring just call us at 1-800-241-IRMA, ext. 64R.*

DCA



*Or call 1-404-442-4500 ext. 64R. © 1990 Digital Communications Associates, Inc. All rights reserved. DCA and 10Net are registered trademarks and IRMAtrac is a trademark of Digital Communications Associates, Inc. All other brand and product names are trademarks or registered trademarks of their respective owners.

See The FAXNeT Form on Page 55

INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

By 1993, about 380 pan-European satellite transponders with capacity equivalent to 1,700 voice-grade channels per transponder will be in service, up from 170 transponders today, according to the European Commission.

World News

Infonet Services Corp. last week said it has signed an agreement with **Compania Dominicana de Telefonos (CODETEL)** to provide X.25 packet-switched services to CODETEL's customers in the Dominican Republic.

CODETEL is a GTE Corp. subsidiary headquartered in Santo Domingo, Dominican Republic. It operates the country's Codepack national public data network.

An interconnection is currently being established between Codepack and Infonet, which is accessible in more than 110 countries for worldwide data, electronic mail, store and forward, facsimile and Telex services.

Infonet is scheduled to begin providing X.25 services in January. The network's X.25 switches will be installed in Bonao, Puerto Plata, Santiago and Santo Domingo, letting users reach Infonet by making a local phone call. ▣

Group pushes for unified toll-free numbering plan

New system could help pan-European businesses.

By Barton Crockett
Senior Editor

THE HAGUE, Netherlands — If Hans Fraasen is right, by the mid-1990s, callers around the world could be using a simplified approach to placing international toll-free calls.

A unified, international toll-free numbering plan could be particularly beneficial in Europe, where companies could use a single toll-free number to conduct business in every Common Market country, rather than use a different number for each country as is now required.

"If you run a television ad, you have to list 12 different toll-free numbers," said Fraasen, who is chairman of a new ad hoc carrier committee examining international toll-free numbering plans. "This is very confusing to the viewer."

Fraasen added that a unified, international toll-free numbering system would help global commerce by making it easier for companies to do business internationally.

Fraasen said there is no reason carriers could not within three years swap their existing disparate sets of numbering systems for a unified international toll-free calling system.

"I think it's possible to do this; otherwise, I wouldn't be working on it," Fraasen said.

In addition to his position as chairman of the carrier committee, Fraasen works here as product manager of international telephone services at the Dutch carrier PTT Telecom.

Fraasen was appointed chairman of the international toll-free carrier committee earlier this year during a meeting in Canada of the International Toll Free Forum, which is a group of carriers that meets annually to discuss toll-free calling services.

Other members of Fraasen's international toll-free calling committee include representatives from AT&T, MCI Communications Corp., British Telecommunications PLC, Singapore Telecom and the Hong Kong Telephone Co. ("Worldwide toll-free services in demand," *NW*, Oct. 22).

Fraasen said that, in his opinion, the best way to deploy a unified toll-free numbering plan would be to use a single international toll-free prefix in place of the country codes now used to place all international calls. In practice, callers would dial the international access code used to place international calls from their country, plus a globally accepted international toll-free prefix followed by a preset number of digits.

> A unified, toll-free numbering system would help global commerce.
>
> ▲▲▲

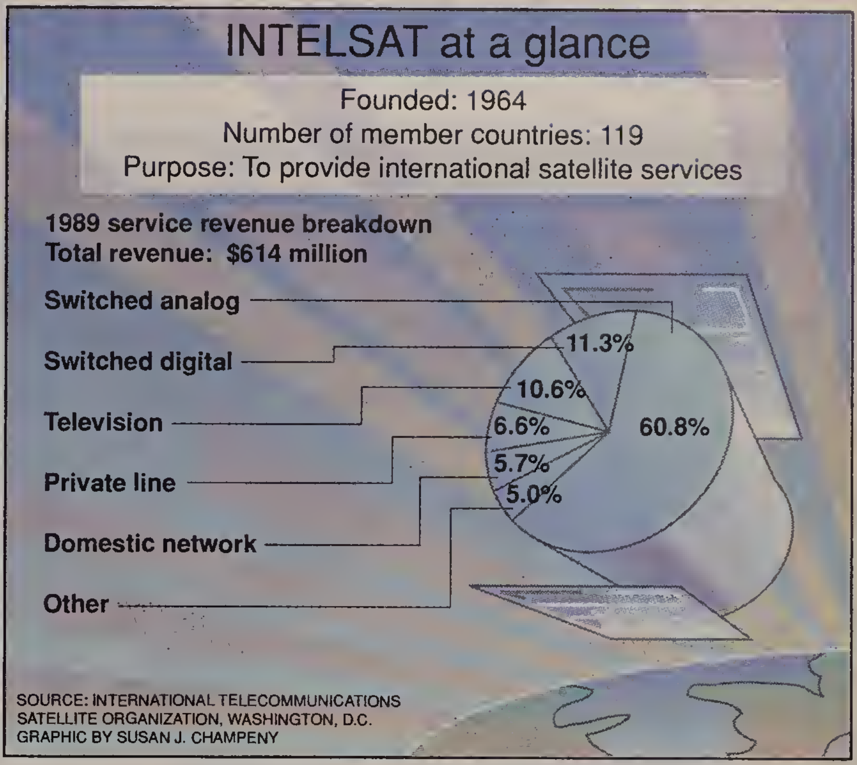
For example, callers placing international toll-free calls from the U.S. could dial 011-800-XXX-XXXX. Callers in the U.K. could use the same 800-XXX-XXXX number, preceded by the U.K.'s 010 international access code.

Thus, companies could advertise toll-free numbers globally by telling callers to dial their country's international access code,

(continued on page 36)

INTELSAT at a glance

Founded: 1964
Number of member countries: 119
Purpose: To provide international satellite services



SOURCE: INTERNATIONAL TELECOMMUNICATIONS SATELLITE ORGANIZATION, WASHINGTON, D.C.
GRAPHIC BY SUSAN J. CHAMPENY

INTELSAT reforms to ease competition

Changes in the organization's treaty mean fewer restraints on private suppliers entering the market.

By Barton Crockett
Senior Editor

LISBON, Portugal — The International Telecommunications Satellite Organization recently adopted changes to its governing treaty that promise to make it easier for private satellite systems to compete with INTELSAT.

By eliminating the requirement for small service providers to consult with INTELSAT before offering service, the reforms could make it easier for some private satellite systems to get off the ground or extend services into new countries.

Also the reforms will significantly shorten, from eight months down to a matter of weeks, the time needed for some private satellite system providers to obtain regulatory approval for service, U.S. officials said.

Specifically, changes were approved to Article 14(d) of INTELSAT's governing treaty that eliminate the requirement for private satellite service providers meeting certain conditions to prove that their system does not cause extensive economic harm to INTELSAT. The treaty change would affect service providers that have less than the equivalent of 30 36-MHz transponders and don't dump into or receive traffic from public switched telephone nets.

The reforms were approved at the biannual meeting of INTELSAT's Assembly of Parties, the leading governing body of INTELSAT that consists of representatives from the 119 countries that own and operate INTELSAT.

"I think, from COMSAT's perspective, the reform package is a positive first step," said Maury Mechanick, vice-president for policy at Communications Satellite Corp. in Washington, D.C.

(continued on page 36)

What it takes to be the international specialist. #1 in a series.

"Overseas facilities management centers."

*—Peter Moebius,
VP—Europe & Africa
World Communications, Inc.*

More and more telecom managers are turning to facilities management centers as the ideal way to establish an efficient global network in the face of rising equipment housing and maintenance costs.

To fill this growing need, we at WorldCom have opened our first overseas facilities management centers. Located in London and Frankfurt, these state-of-the-art complexes offer primary and backup access from the national carriers and can serve as the hub for all of your telecommunications within the U.K., Germany and throughout Europe.

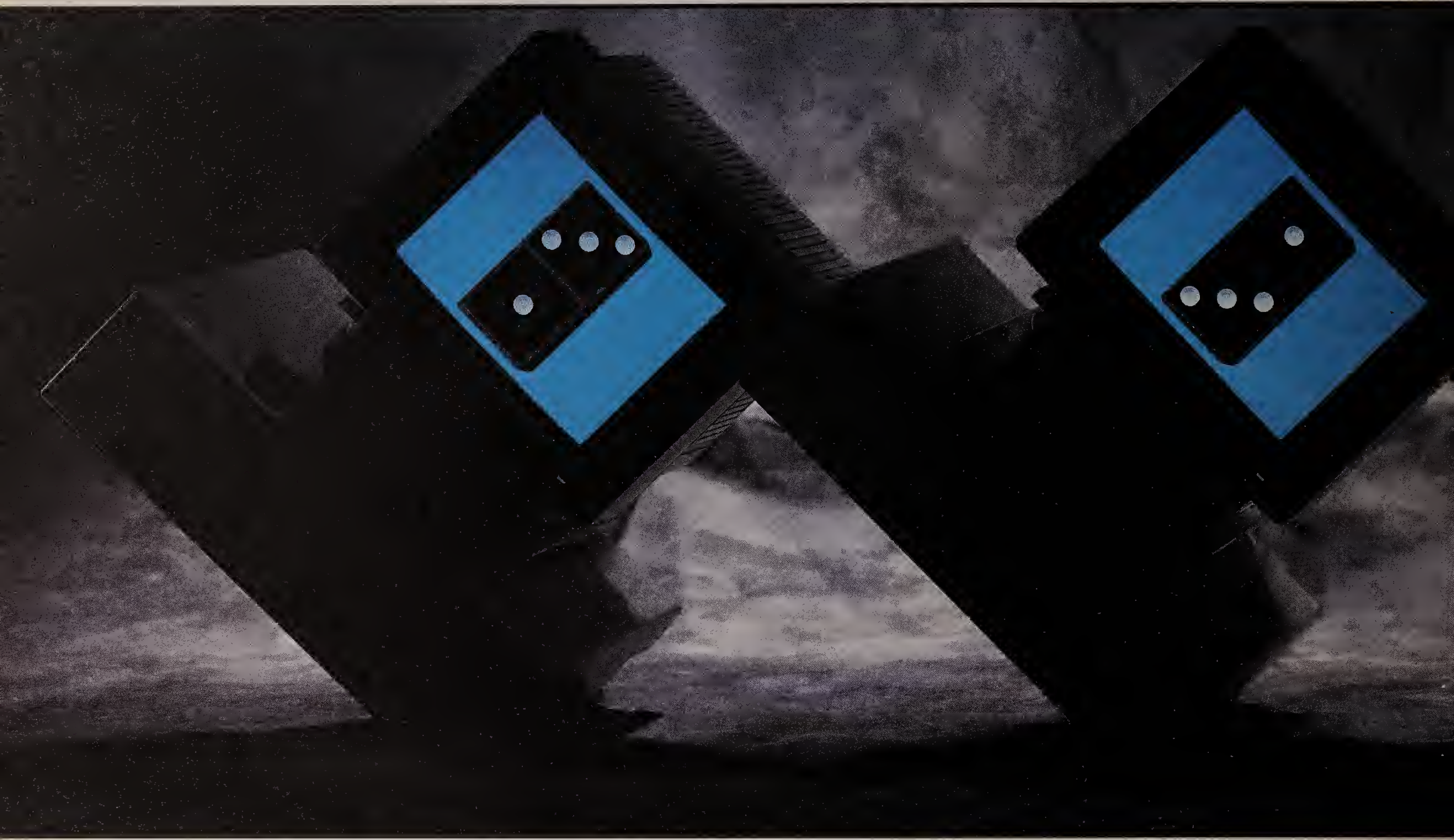
By housing your equipment on our premises and under our care, you get 24-hour maintenance and security, which can reduce your staffing requirements and free up expensive floor space for other uses. You also gain access to our expertise in foreign regulations, equipment standards, and even local customs and culture which can have an impact on telecommunications.

For more information about our European and U.S.-based facilities management centers, contact us at 800-733-3755, fax: 212-607-2274

WorldCom
THE INTERNATIONAL TELECOMMUNICATIONS SPECIALISTS • A TELE COLUMBUS COMPANY

See The FAXNeT Form on Page 55

Get AT&T EDI. Because if one



Here at AT&T, we know that an Electronic Data Interchange service is only as good as its component parts. That's why we've designed each part of AT&T EDI to be equally strong. Why does our EDI stand up to your business' needs better than any other? It's a matter of simple addition.

Network

AT&T EDI is part of the AT&T Global Messaging Network. This network is based on our patented "Message Transfer Architecture" that uses CCITT MHS X.400, the internationally accepted messaging standard. So you can easily link up with trading partners around the world. And you can send and receive encrypted data, ensuring the security of sensitive documents. Furthermore, the AT&T Global Messaging Network can be used not only for EDI but for electronic mail and enhanced fax.

+Systems

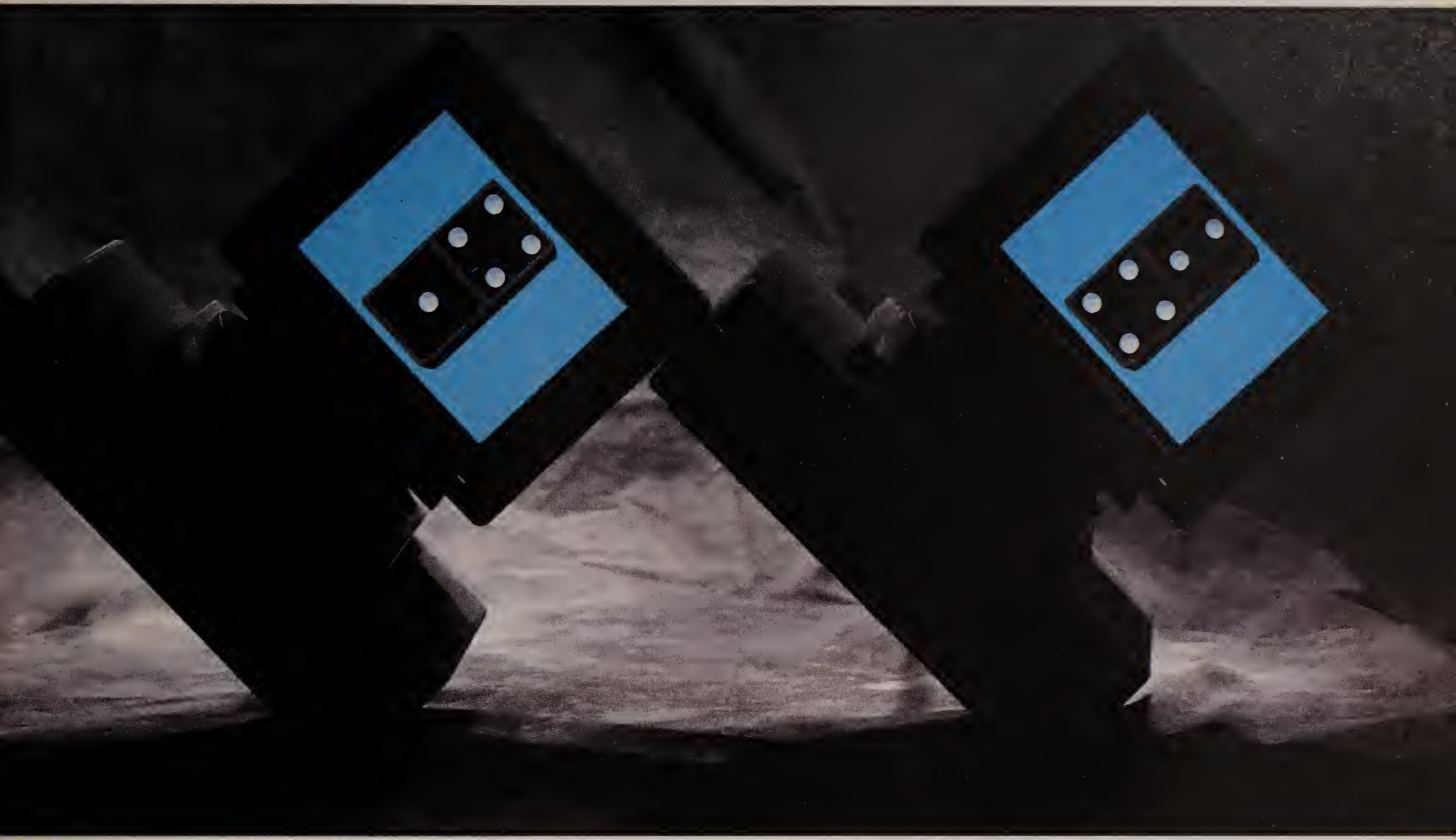
Our unique open architecture means that our EDI can work with whatever systems you have, whether they're mainframe, mini or PC-based. We have the software and systems for you and your trading partners, no matter what size they are or how advanced they may be. And with our open architecture, we make it easy for your system to adapt as your business grows.

+Support

From the day you start talking with us about EDI, you can get an extensive range of support services. From

©1990 AT&T

piece is out of balance, well, you know what'll happen.



customized trading partner conferences and implementation seminars to on-site technical support. You also get the benefit of our extensive experience with EDI. After all, we've been using EDI here at AT&T for more than ten years.

=The best EDI.

So get the most advanced EDI network there is, with the most flexible systems and unsurpassed support. AT&T EDI. Because, on balance, the best EDI is the sum of superior parts.

Quality. Another AT&T advantage.

For more information, call your AT&T Account Executive or 1 800 367-7225.

AT&T
The right choice.

INTELSAT to ease competition

continued from page 33

Since it was founded in the 1960s, INTELSAT has required all other international satellite service providers to prove that they will neither interfere technically with the INTELSAT system nor represent an economic threat.

The requirement to prove that competing systems would not pose an economic threat was maintained to ensure that INTELSAT would be economically viable since it was believed that only a monopoly could generate enough revenue to cover the enormous expense of maintaining an international satellite system.

As a result, both Alpha Lyracom Pan American Satellite Corp. (PANAMSAT) in Greenwich, Conn., and Orion Satellite Corp. in Rockville, Md., had to go through extensive hearings to prove that their planned private satellite systems would not put INTELSAT out of business.

PANAMSAT and Orion received approval only after agreeing not to compete with INTELSAT in the provision of international switched telephone service, which accounts for 90% of INTELSAT's revenue, and proving that they do not provide a serious threat to INTELSAT economically.

New hearings must be held to examine the economic threat to INTELSAT each time one of the service providers tries to extend service into a new country, according to Henry Goldberg, a partner in the Washington, D.C. law firm Goldberg & Spector, which represents PANAMSAT.

Goldberg said the hearings put PANAMSAT at a competitive disadvantage since it must wait weeks for approval to extend service into a new country while INTELSAT can provide service almost immediately.

PANAMSAT actually opposes the reforms approved last week, he added.

They won't help the service provider because its satellite capacity exceeds the 30 36-MHz transponder ceiling.

So under the new reforms, PANAMSAT will be regulated like it always has been, Goldberg said.

Helping Columbia

But the official on the U.S. delegation countered that the new rules will help at least one private satellite service provider, namely Honolulu's Columbia Communications Corp. That company owns 24 transponders on two National Aeronautics and Space Administration satellites and is about to ask INTELSAT for permission to provide international satellite services ("New transponders to ease int'l satellite link shortage," *NW,* Sept. 24).

The official suggested that PANAMSAT opposed the changes due to fear that it would be put at a competitive disadvantage with Columbia.

He added that the reforms adopted this week are expected to be followed in two years by further reforms, which will drop all economic harm proceedings for all private satellite systems not providing international switched telephone services. ◪

MOTOR MOUTH.

Ever wonder how much you could say if you could speak **really** fast? **Twice as fast** as you can now? **Quadruple** that, and you're up to speed with me. I'm the **Racal-Vadic 9642PA**, and I'm **the last dial-up modem your network will ever need**.

How do I know? For starters, my exclusive "**Extended V.32**" feature boosts ordinary V.32 9600 bps throughput to a full **14,400 bps** on ordinary **dial-up** lines! And sure, I could slow down to a **full-duplex** 12000, 9600, 4800, 2400, 1200, or 300 bps. But only if I have to.

Besides, I support the data comm **standards** you need most. Like the **new** CCITT **V.42** error correction and **V.42*bis*** data compression specs. As well as **MNP® classes 2-5** error correction and data compression. I'm also compatible with other popular standards, **including** V.22*bis*, V.22 and V.21, Bell 212A and 103, plus Bell 208A and 208B, too.

If I had **more** time, I'd **boast** about my **countless** other virtues. Like dial-up, and **2- or 4-wire leased line** support. V.33 with single call **automatic dial-backup and restoral** at 14.4 Kbps. V.25*bis* and Hayes® autodialing. **Remote modem control**. Built-in **callback security**. Even my noninterruptive **network management** capabilities. And when you want me to change my ways, just give me a poke on my **front panel controls**.

Now that's a **mouthful**. And it's just the tip of the iceberg. Find out more about yours truly, the **9642PA**, and my **rack-mountable twin**, the **VA9642E** — two complete modems on one card.

Call 1-800-482-3427, and ask for the name of your nearest **Racal-Vadic** distributor.

OK, enough talk. Now back to **work**...

Sssccccrrrreeeeeeeeeecccchhh!!!

RACAL
The Electronics Group

Racal-Vadic
THE DIAL-UP AUTHORITY

© 1990 Racal-Vadic, 1708 McCarthy Blvd., Milpitas, CA 95035 • Tel: (408) 432-8008 • Fax: (408) 434-0188. All products or brand names listed are trademarks or registered trademarks of their respective holders.

See The FAXNeT Form on Page 55

Group pushes for unified plan

continued from page 33

plus the 800-XXX-XXXX number.

Fraasen said 800 may be the best number to use as an international toll-free prefix because it is not currently used as a country code.

Over the next year, Fraasen said his committee will examine the degree of user demand for a unified international toll-free numbering plan, as well as the technical feasibility of deploying such a system.

If the committee decides that a unified international toll-free numbering system would be technically feasible and desirable, it will ask the Consultative Committee on International Telephony and Telegraphy to develop it by approving new CCITT recommendations for international toll-free calling services.

According to Fraasen, a new global toll-free calling recommendation could be approved by the CCITT within two years. This means that the system could be supported by major carriers worldwide within three years, he said. ◪

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Scientific-Atlanta unveils VSAT backup system

Scientific-Atlanta, Inc. recently announced a backup system for its SkylinX.25 VSAT network that can reestablish a network link in the event of an outage.

The company's **Restore** software runs on an X.25 packet switch linked to a very small aperture terminal at a remote customer site.

When it detects a loss of a signal with a satellite, the software automatically switches over a link to a terrestrial dial-up network line.

Modems at the network's hub answer the call and connect it to the host port on the hub's packet switch or to a concentrator with a high-speed link to the packet switch.

Scientific-Atlanta said that as many as four users can reestablish host links from a remote site over a single dial-up line.

The Restore software, which is available now, costs from $300 to $500 per remote site, depending on VSAT configuration and usage.

Scientific-Atlanta, Inc., 1 Technology Pkwy., Atlanta, Ga. 30348; (404) 441-4000.

White Pine offers Mac-to-VAX videotex link

White Pine Software recently announced **VTXpress,** a software interface that connects Apple Computer, Inc. Macintoshes to Digital Equipment Corp. VAX VTX videotex networks.

VTXpress provides users with a Macintosh interface to access data stored on VAX VTX videotex networks running on DEC VAX/VMS-based processors.

Instead of using DEC's VTX terminal command-line interface, Macintosh users can utilize icons, windows, menus and pointers that are typically found within a Macintosh environment.

Information from a videotex network can be printed, stored or transferred to other applications through a Macintosh Clipboard. VTXpress supports multiple sessions via separate Macintosh windows, which allows users

(continued on page 70)

Republic Telcom boosts voice/data multiplexer line

Low-end unit costs 40% less than predecessors.

BOULDER, Colo. — Republic Telcom Systems Corp. recently announced a new low-end model to its N line of integrated voice/data multiplexers that costs 40% less than current entry-level units.

The RLX-4N multiplexer is suitable for point-to-point links between remote sites, regional offices or retail stores, the company said.

Unlike Republic Telcom's RLX-8N, which provided users with as many as eight voice channels for between $10,000 and $30,000, the new model is equipped with only four channels and a maximum of two data channels. This allows users to mix voice, data and facsimile traffic over circuits operating from 19.2K to 128K bit/sec.

The RLX-4N models can also be used in a mesh network in which the company's RNET multiplexer — a Tandem Computers, Inc. fault-tolerant computer that acts as a switching hub — passes traffic among remote sites in a star configuration.

In addition to managing traffic flow on a point-to-point basis, the RLX-4N can be programmed to commandeer the entire circuit bandwidth for high-speed file transfers on off-peak hours, according to Scott Mosley, director of marketing at Republic Telcom.

The RLX-4N, for instance, can support late night polling of remote sites by a mainframe application responsible for uploading sales and inventory data, Mosley said.

Attached to a 64K bit/sec line, the RLX-4N can be configured to support four voice channels and a single 32K bit/sec data channel; three voice channels and four 9.6K bit/sec data links; or two voice channels, one 32K bit/sec data channel and a 9.6K bit/sec fax channel.

On a 128K bit/sec line, the unit will support four voice channels, a 32K bit/sec data channel and a 64K bit/sec data channel; or two voice channels, a 32K bit/sec data channel, a 64K bit/sec data channel and a 9.6K bit/sec fax channel.

The RLX-4N can be configured locally or via remote dial-up access and can be managed by the company's RNET Network Control System.

The RLX-4N supports a single 128K bit/sec line or two 56K or 64K bit/sec links.

Pricing ranges from $6,000 to $24,000, depending on the mix of voice and data channels specified when ordering the unit. The RLX-4N is expected to ship next month.

Republic Telcom can be reached by writing to 6150 Lookout Road, Boulder, Colo. 80301, or by calling (303) 530-8600. ▣

GTE Spacenet upgrades Skystar Network Service

By Jim Brown
Senior Editor

MCLEAN, Va. — GTE Spacenet Corp. recently enhanced its Skystar Network Service to ease the transfer of data between hosts and remote very small aperture terminals and to improve network management.

The company's new Skystar Plus offering enables users to install two Ethernets at a private VSAT hub site. One Ethernet replaces a more expensive packet switch that routes data between the hosts and a satellite earth station. The other eliminates the need to directly attach net management consoles to a central-site minicomputer dedicated to network management.

Announced last month, Skystar Plus is not expected to ship until the second half of 1991.

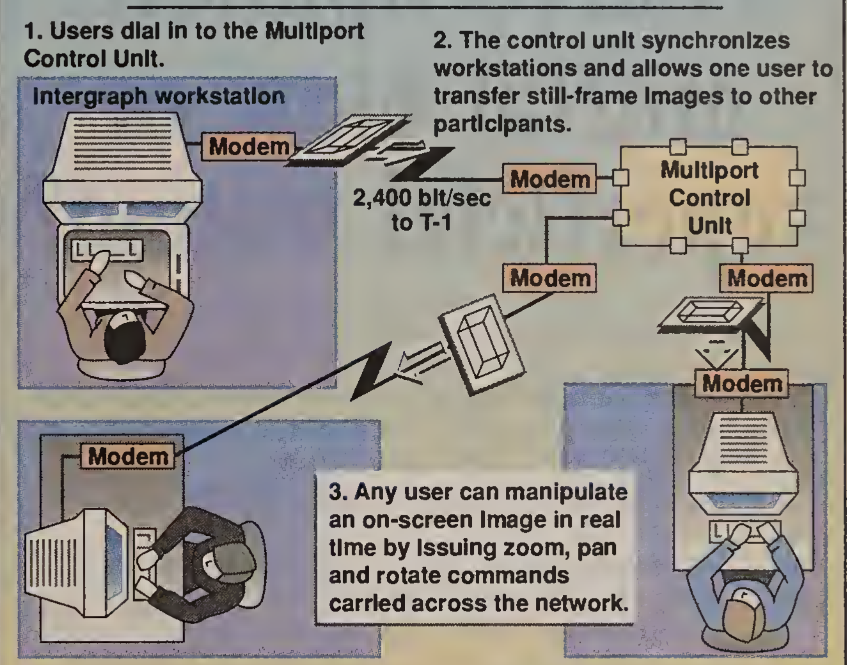
The first Ethernet supports a series of GTE Data Concentrators, which are eight-port devices that link hosts to the Ethernet, and a series of Satellite Access Controllers (SAC), each of which can address 200 remote VSATs but are typically configured to address between 20 and 25 for performance reasons.

When a host sends data to a remote VSAT, it passes the data to a port on the Data Concentrator at up to 56K bit/sec. The concentrator reads the data address and routes it over the Ethernet to the SAC that communicates with the VSAT destination in question. The SAC then passes the data to an earth station, which bounces it off a satellite to the VSAT.

Existing Skystar Network Service private hub users must connect each host and each SAC to a more expensive packet switch.

(continued on page 70)

Intergraph's CAD conferencing


1. Users dial in to the Multiport Control Unit.
Intergraph workstation
Modem
2,400 bit/sec to T-1
2. The control unit synchronizes workstations and allows one user to transfer still-frame images to other participants.
Modem
Multiport Control Unit
Modem
Modem
Modem
Modem
3. Any user can manipulate an on-screen image in real time by issuing zoom, pan and rotate commands carried across the network.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INTERGRAPH CORP., HUNTSVILLE, ALA.

Intergraph ushers in CAD conferencing era

Up to eight users can simultaneously view, edit design files in real time over wide-area networks.

By Charles Bruno
Assistant Managing Editor

DETROIT — Intergraph Corp. this week will introduce a product that enables as many as eight remote users at computer-aided design workstations to establish a networked conference to simultaneously view and edit a CAD file.

The company's CAD Conferencing Module, which will be announced at the Autofact '90 trade show here, will enable engineers to review product designs with customers, suppliers or manufacturing personnel on-line. This capability will reduce delays inherent in shipping blueprints among the various parties.

In addition, CAD Conferencing Module will enable companies to speed up the processing of engineering change orders in which different department managers must sign off on a design file.

Instead of routing blueprints to the respective managers, CAD Conferencing Module will enable the necessary personnel to join a conference session and either sign off on the file while on-line or electronically pencil in necessary changes.

"Without leaving their offices, engineering and management teams around the globe can work together on projects in real time," said Lloyd Tarver, executive director of systems marketing. "This is what customers of design networks have been dreaming about for ages."

The product is the first attempt by Intergraph — one of the largest suppliers of CAD software, graphics workstations and network servers — or any CAD supplier to bring users together over wide-area networks, the company said.

CAD Conferencing Module is a hardware and software package developed by DataBeam Corp. of Lexington, Ky., that runs on Intergraph's Series 300, 3000 and 6000 workstations.

DataBeam ported a previous DOS-based product, which ran on an IBM Personal Computer AT workstation, to Intergraph's Unix workstations. By running under Unix, users can establish a CAD conference and toggle between a CAD application on one screen and the conference on another.

> "This is what users of design nets have been dreaming about for ages," Tarver said.
>
> ▲▲▲

The primary component is a telecommunications interface card that fits into a single slot of an Intergraph workstation. The card, which comes bundled with software, enables users to access a variety of telecommunications lines, from 2,400 to 2.048M bit/sec. Data is transmitted via a V.32 modem connection to a public or private circuit.

CAD Conferencing Module

(continued on page 70)

TARIFF 12

BY JAMES BLASZAK AND PATRICK WHITTLE

Court's opinion: mortal blow or superficial wound?

AT&T's competitors have heralded the recent Tariff 12 reversal by the U.S. Court of Appeals for the District of Columbia as a major victory. AT&T, on the other hand, wants current and prospective Tariff 12 customers to believe that the court's opinion is only a superficial setback.

It almost looks as if the carriers didn't read the same court opinion.

During the court proceedings, AT&T's competitors argued vigorously that Tariff 12 is unlawful for two reasons.

The first is because Tariff 12 options are designed to meet the requirements of single customers rather than a larger group of customers and, therefore, are inconsistent with the obligations of a common carrier. Second, Tariff 12 options are like other communications services and are unjustifiably offered at rates lower than the other services.

> For the foreseeable future, current Tariff 12 deals are probably not in jeopardy.

▲▲▲

The court found no merit in the other interexchange carriers' first argument, a fact that is quite significant. If the court had agreed with their first argument, Tariff 12 would indeed have been dealt a mortal blow.

As for the other carriers' second argument, the court found that the Federal Communications Commission improperly considered cost differences in evaluating whether Tariff 12 service is like other communications services. The court ignored the rest of the FCC's analysis, which found Tariff 12 service to be different from other communications services.

Certain passages in the court's decision suggest that by focusing on the differences in services rather than cost, the FCC should be able to write a sustainable decision finding Tariff 12 services to be lawful. The differences exist, as scores of Tariff 12 customers can attest. The FCC must assess these differences anew in preparing a legal analysis to satisfy the court.

In short, the court's opinion is far from the mortal blow some industry pundits have described. But it does create uncertainty and risks that existing and potential Tariff 12 customers should acknowledge. Although the decision gives AT&T's competitors no new ammunition in their fight against Tariff 12, the court has perhaps given them another shot at convincing the FCC that the tariff is unlawful.

For the foreseeable future, current Tariff 12 deals are probably not in jeopardy. The processing of options that are pending or not yet filed, however, could be slowed down. Furthermore, some people within the FCC might attempt to force other changes to Tariff 12. Network managers should factor the risks created by the court's opinion into their evaluation of the economic utility of Tariff 12 proposals. They should also be aware that deals with AT&T's competitors could present other kinds of legal risks, thanks to currently pending AT&T complaints against MCI Communications Corp. and US Sprint Communications Co. in which AT&T claims that MCI and US Sprint should not be allowed to offer rates other than those reflected in their published tariffs.

Unfortunately, network managers will be forced to cope with both types of risks for at least six to 18 months. Managing these risks makes it even more imperative than ever that managers stay informed of regulatory developments affecting Tariff 12.

Blaszak and Whittle are partners in the law firm of Gardner, Carton & Douglas, with offices in Washington, D.C. and Chicago.

NETWORK WORLD

Editor
John Gallant

Executive Editor
John Dix

Assistant Managing Editor — News
Charles Bruno

Senior Editors
Bob Brown — Industry Update
Jim Brown — Data Communications
Barton Crockett — International Networking
Paul Desmond — Data Communications
Wayne Eckerson — Management Strategies
Bob Wallace — Telecommunications

Senior Writer
Tom Smith — Local Networking

Staff Writer
Maureen Molloy

West Coast Bureau
2088 Union Street, Suite 2
San Francisco, Calif. 94123

Washington D.C. Bureau
Anita Taff — Bureau Chief
(202) 347-6184

Ellen Messmer — Correspondent
650 National Press Building
529 14th Street NW
Washington, D.C. 20045
(202) 347-4180

Features Editor
Paul Strauss

Managing Editor — Features
Bruce Guptill

Features Writer
Salvatore Salamone

Assistant Features Editors
Alison Conliffe
Susan Collins

Art Director
Dianne Barrett

Informational Graphics Designer
Susan Champeny

Junior Graphic Designer
Susan Slater

Assistant Managing Editor — Production
Beth Khoury

Associate Editor
Joanne Cummings

Copy Editors
Michelle Beaulieu
Karen Moltenbrey

Assistant to the Editor
Cheryl Tynan

Editorial Assistant
Tracie Seder

Contributing Editors
Daniel Briere
James Kobielus
Edwin Mier
Alan Pearce

President/Publisher
Gary J. Beach

Director of Financial Operations
Mary Fanning

Network World
161 Worcester Road
Framingham, Mass. 01701
(508) 875-6400
MCI Mail — 390-4868
FAX: 508-820-3467

An IDG Communications Publication

USER ADVISORY PANEL

Laurie Bride
Manager, Network Architecture
Boeing Computer Services

Roy Bruce
President
International Communications Association

Al Crawford
Senior Vice-President
American Express TRS Technologies, Int'l

Phillip Evans
Director, Telecommunications
FMC Corp.
Senior Vice-President
International Communications Association

Len Evenchik
Director of Communications
The Commonwealth of Massachusetts

Thomas Festa
President
Wall Street Telecommunications Association

Lionel Gillerman
Telecommunications Services
McDonnell Douglas Aerospace
Information Services Co.
Vice-President for Regulatory Affairs
Tele-Communications Association, Inc.

Jan Hackmann
Director of Telecommunications
Multicare Medical Center
President, Tele-Communications Association, Inc.

Michael Kaminski
Manager, CIM/Networking Technologies
General Motors Corp.

Ron Kopitowsky
Telecommunications Director
Metropolitan Transportation Authority, New York State
President, Communications Managers Association

Chuck Papageorgiou
Network Administrator
United Parcel Service

Henry Pfendt
Director, Information Technology Services
Eastman Kodak Co.

Kenneth Phillips
Vice-President, Office of Telecommunications Policy
Citicorp
Chairman, Committee of Corporate
Telecommunications Users

William Pomeroy
Director of Telecommunications Public Policy
International Communications Association

Michael Toto
Vice-President, Corporate Telecommunications
Johnson & Higgins
President
Association of Data Communications Users

Stanley Weiland
Manager, Corporate Telecommunications
General Electric Co.

EDITORIAL

Declaring a winner before the Tariff 12 race is over

An appeals court has knocked down Tariff 12. Naturally, its fans say it still has plenty of vigor, but we really don't know yet whether Tariff 12 has been knocked down for the count.

Another commentary on this page says Tariff 12 definitely will reemerge. But this represents the views of large users that stand to lose if AT&T's Tariff 12 is crippled. It thus stresses that Tariff 12 has not been ruled illegal per se.

Quite true. Instead, the appeals court judges say the Federal Communications Commission did not conduct its investigation properly. But reviving Tariff 12 won't necessarily be a snap. Several significant legal issues remain.

The court endorsed the concept of tariffs arising from specific carrier negotiations with individual customers. But it also ruled that the FCC must reopen its investigation of the lawfulness of the Tariff 12 deals already on file.

The FCC will now have to reexamine many of the legal questions it previously chose to leave unanswered. For instance, it must decide whether Tariff 12 packages differ from their underlying component services, but this time, it can't take price differences into account. And the FCC must compare Tariff 12 packages to determine if the rather large price differences are legal.

Opponents claim that if the FCC carries out these analyses according to the court's guidelines, there's no way the commission can find Tariff 12 deals to be lawful.

So Tariff 12 is in a kind of limbo. Nevertheless, since AT&T must find some way to serve large users, Tariff 12 will probably either be modified to create a less discriminatory pricing structure or AT&T will simply file a new custom network tariff — perhaps called Tariff 20.

On the other hand, Tariff 12's opponents are unlikely to go to sleep. So any decision the FCC makes will probably wind up back in court.

These are the probabilities. Beyond them, the ultimate question is who wins in this prolonged and disputatious process? Unfortunately, it's not likely to be users. Carriers will probably spend too much time and effort trying to outmaneuver one another to concentrate on serving users.

Users will have to grapple with the legal limbo of Tariff 12. During what seems likely to be a long period of ambiguity, they must worry about whether they can justify decisions to sign — or even continue negotiating — Tariff 12 deals.

Let's hope the FCC puts its full efforts into resolving the many legal questions raised by Tariff 12 rather than just applying a regulatory bandage.

INDUSTRY

BY JOHN MCQUILLAN

Recession: Good news or bad news for networking?

Everyone acknowledges that our economy is slipping — if not stumbling or collapsing — into a recession. What does the threat of recession mean to us in the networking field? Will the communications business suffer greater damage than the economy as a whole? Or will it prosper as users substitute telecommunications for transportation and other services?

These are difficult questions that I am not completely qualified to answer, but let me speculate.

Some information technology analysts have suggested that the networking industry will prove resistant to recession because networking's high-quality information transfer can replace travel and face-to-face meetings. For many people in our industry working in diverse areas such as videoconferencing, compound document architecture and speech recognition, substituting communications for travel has been akin to the Holy Grail.

Personally, I doubt that this will happen. No evidence exists that people use videoconferencing to replace travel. In fact, videoconferencing replaces or augments traditional voice communications in most cases. Obviously, in a recession, many users would simply go back to using traditional voice and either avoid or minimize their use of video communications.

In addition, it's even more difficult to claim that local-area network-to-LAN links or other advanced forms of networking can replace travel. It's plausible that such technologies will become more valuable during times of difficult business conditions because they allow faster and more accurate decision making.

However, in most cases, whatever competitive edge networking offered has eroded. The widespread adoption of networks has now made them simply another cost of doing business, as eligible for cutting as any other form of overhead.

Some forms of communications will boom even in bad times, but these are more likely to be found in the residential market. For example, it's a good bet that cable television will continue to do well as more people stay at home rather than pay to go out for the evening. But what will happen with corporate networks if times get tough?

Consider the buying frenzy that swept through the computer business during the past five to seven years. The personal computers that everyone bought have now probably been upgraded or replaced. Most users have gone through two generations of printers and installed LANs, interconnected them and possibly upgraded them.

> Most organizations will become more skeptical about the need for ever-increasing firepower at the desktop.
>
> ▲▲▲

Except in unusual situations where the applications are mission-critical, however, it's now going to be much more difficult to persuade upper management that you need to double the memory in your desktop system. Most organizations will become more skeptical about the need for ever-increasing firepower at the desktop just to turn out more beautiful memos and reports. Many information technology directors and purchasing managers are probably thinking enough is enough, especially in recessionary times. That kind of progress is acceptable when times are good, but it's one of the first casualties when budgets need cutting.

One of the difficulties network managers face is that computers don't really save time. In fact, they consume a tremendous amount of time. Now that computers can produce multiple drafts on laser printers and make them beautiful using desktop publishing, people spend more time writing memos than they ever did before using typewriters.

Who knows how much time users have spent rummaging through libraries of clip art for desktop publishing? Or how many years users have lost debugging LANs? Time spent dealing with computer-related tasks will be counted much more closely in the economic downturn that is just beginning.

Some other rather discouraging signs also exist. Telecommunications, perhaps more than most businesses, is dependent on high technology, on the infusion of new ideas and the creation of new businesses through the instruments of venture capital and entrepreneurship.

In difficult times, entrepreneurs still come up with ideas and venture capitalists still make investments, but they both do so with a bit more reluctance and perhaps on a somewhat reduced scale.

Venture capitalists will be more interested in deals that have a lower risk, a lower reward and a shorter term payoff. The pace of change will slow. The emphasis will shift to consolidating the gains already made rather than establishing new beachheads on ever more distant shores.

In short, I predict that the network business will probably experience even slower growth than the average business segment during the recession. While this is going to be painful for quite a few people, it is not altogether a bad thing. It will force the network industry to pause and take a breath.

McQuillan is president of McQuillan Consulting in Cambridge, Mass. He assists users and vendors in planning communications systems.

'TIS BETTER TO HAVE NETWORKED AND LOST than never to have networked at all. Don't you agree? Let us know in an opinion column for *Network World.*

Columns should be 600 words in length and submitted on disk, via modem or through MCI Mail at 390-4868.

If you'd like to write a column, call Alison Conliffe, assistant features editor, at (508) 820-7416 or fax your idea to us at (508) 820-3467.

TELETOONS

BY FRANK AND TROISE

The History of Networking
#29
Feb. 4, 1957
Inventor Niles Nervish stuns the fledgling communications industry with his clumsy but workable conference call telephone system:

LETTERS

Insensitivity in advertising

In the Oct. 8 issue of *Network World,* AT&T ran an advertisement printed on what appeared to be Mylar to emphasize the "virtually indestructible" nature of AT&T's 800 service.

In times of diminishing natural resources and overburdened landfills, AT&T's needless use of a virtually indestructible material for a brochure certain to be discarded shows an insensitivity to the greater societal concerns that face us all.

As network professionals and as human beings, we each have a responsibility to live our lives with personal integrity and concern for the individuals with whom we interact. Yet in their most recent media campaign, AT&T tries to play on the fears and insecurities of its target audience. I do not enjoy having my intelligence insulted by a broadcast campaign of doomsaying and half-truths, and this latest print advertisement is just one more reason for me to avoid AT&T.

As a data communications manager, I place a high priority on consistent performance and responsive service. I strive to achieve these goals, and I am meeting them with the help of some positive, forward-looking vendors — vendors that care about my business.

The ad may achieve ecological immortality in America's landfills, but the attitude it symbolizes is why AT&T is not my network provider.

For our businesses to succeed in an increasingly competitive marketplace, we as network professionals must strive to provide timely support for immediate needs with intelligent choices that demonstrate a commitment to the future.

Douglas Shelton
Network consultant
Bytestream Technologies
Overland Park, Kan.

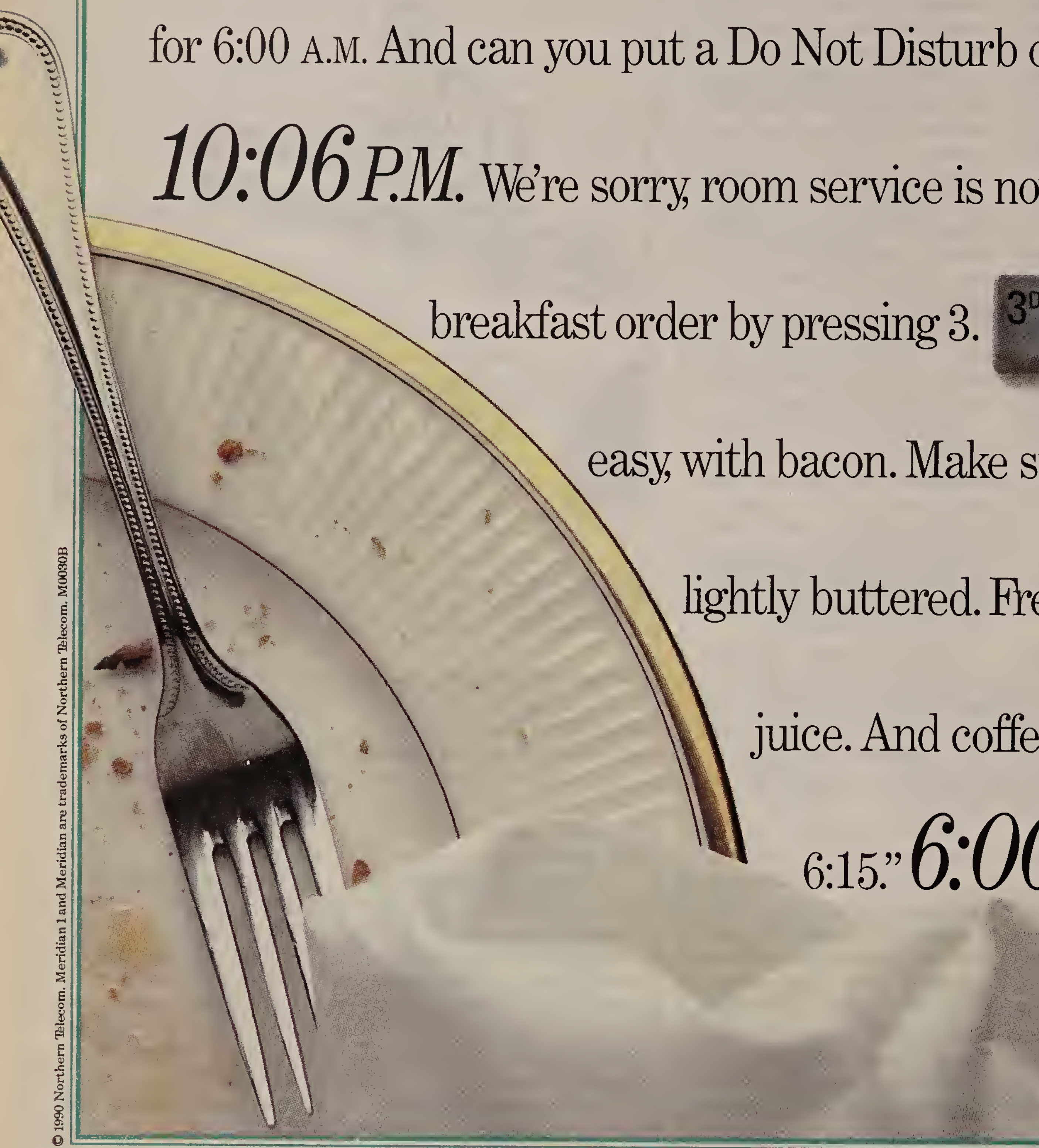
Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

9:45 P.M. Welcome. This is Guest Messaging. You received one call before you checked in. Message one: "John, this is Ted. They moved our meeting up to 8:30. I'm not sure where, yet. I'll call you in the morning to let you know." 10:00 P.M. "I'd like a wake-up call for 6:00 A.M. And can you put a Do Not Disturb on my phone? Thanks."

10:06 P.M. We're sorry, room service is now closed. You can place a breakfast order by pressing 3. 3DEF "I'd like two eggs, over easy, with bacon. Make sure the bacon's crispy. Toast, lightly buttered. Freshly squeezed orange juice. And coffee, black. To room 235 at 6:15." 6:00 A.M. Good morning. This



© 1990 Northern Telecom. Meridian 1 and Meridian are trademarks of Northern Telecom. M0030B

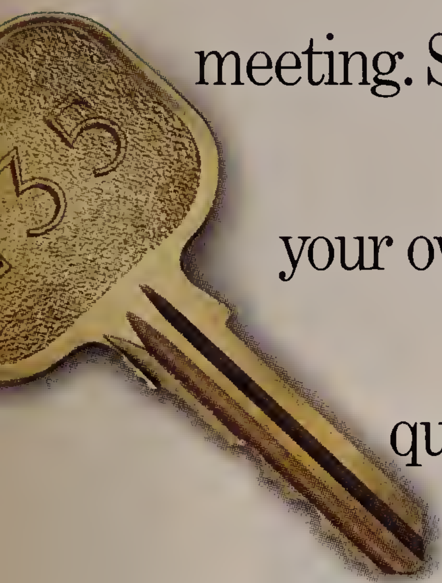
THIS GUEST'S STAY DEMANDS

Meridian 1 makes life easier by putting stand-alone features and PBX functions in one modular package.

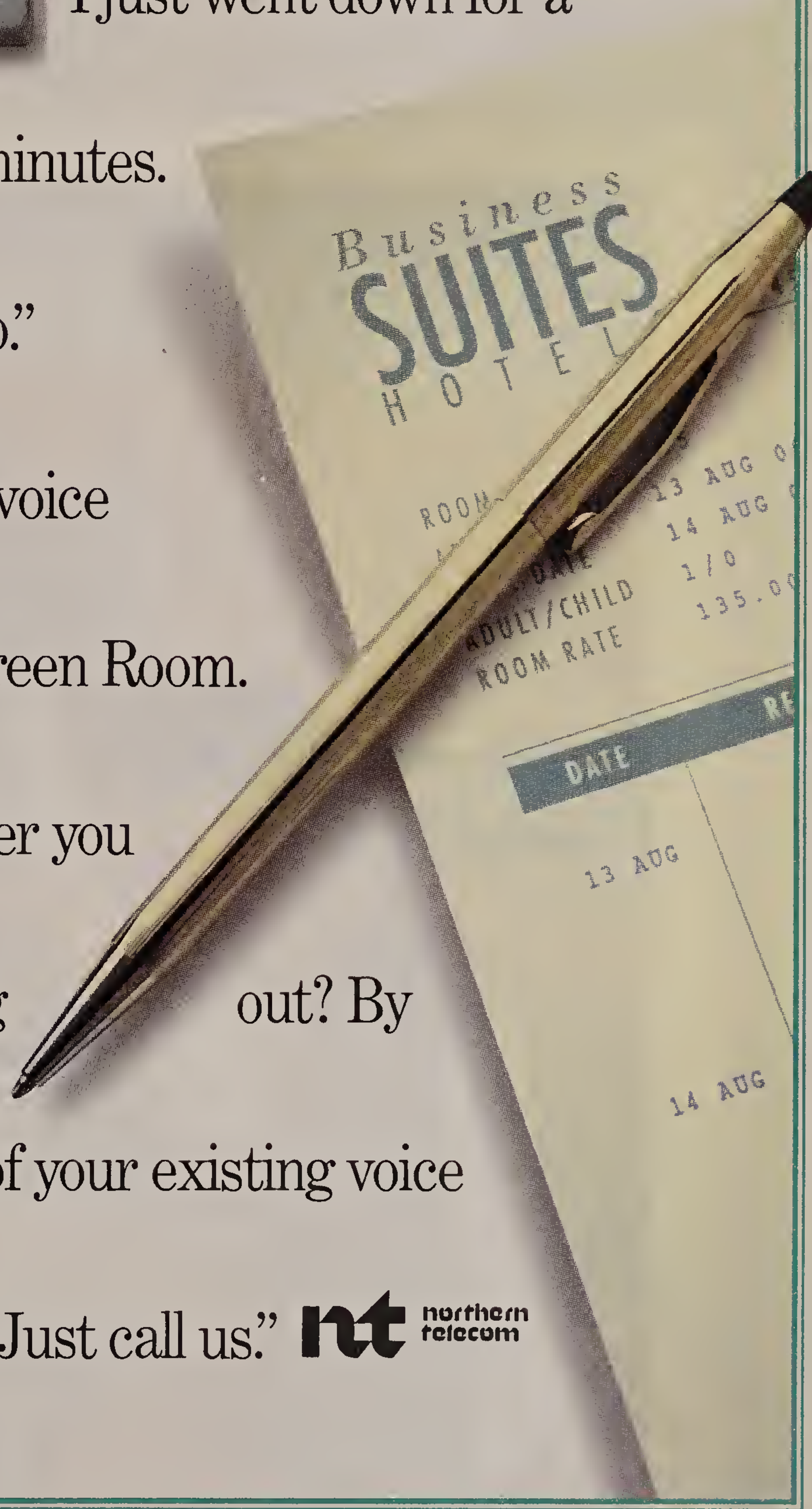
Meridian 1
Communication Systems

To handle all these various calls and features, Northern Telecom's Meridian 1 Communication Systems works with a hotel's Property Management System—the computer application that manages all hotel guest transactions. And frankly, ordinary PBXs just aren't smart enough to do this.

That's because the Meridian 1, unlike your average PBX, put features like voice mail, networked ACD, and interactive voice response in one modular package and is your wake-up call. Message You have one new voice message. Message one: "John? Ted again. Don't forget to bring the revised contract to the meeting. Still don't know what room we're in." *7:00A.M.* To record your own personal greeting, press 7. 7 PRS "I just went down for a quick workout. I'll be back in a few minutes. Leave your message at the sound of the beep."



7:20A.M. Message You have one new voice message. Message one: "John, we're in the Green Room. See you there at 8:30. Oh, and that fax number you need is 555-4473." *8:00A.M.* "Checking out? By the way, Mr. Siebert, if you need to hear any of your existing voice messages, you can access them for 24 hours. Just call us." **nt** northern telecom



MORE THAN AN ORDINARY PBX.

taught them how to work with each other in a way no ordinary PBX ever could. Making it a very intelligent, very efficient communication system for your business. And we say that without reservation.

Call **1-800-328-8800** and compare the many applications Meridian 1 offers your business to what an ordinary PBX can do. You'll find that it's more than a PBX.

NORTHERN TELECOM

TECHNOLOGY THE WORLD CALLS ON

Gridlock alert: source routing

By ROBIN LAYLAND

Like someone who has a split personality, source routing has two distinct temperaments. In its sunny disposition, source routing is a useful algorithm that lets devices on a token-ring network locate one another and determine the best path to take.

But source routing also has a gloomy side, almost a malicious disposition. In that character, it frenziedly throws off broadcast messages, thereby creating severe network congestion.

In networks where source routing is used, network designers face a challenge: They must work with the sunny side of the technology to structure the network to handle their company's needs, yet they must not forget the gloomy side's potential to degrade all that has been built up.

Two devices located on separate token-ring local-area networks can communicate only if there are six or fewer intermediate token rings between them. This limitation, called the hop count, results from the size of the source routing field. A message can pass through a maximum of seven bridges, or hops, before the routing field is exhausted.

Hop counts are set in the bridge software and are individually determined for each token-ring network. A network's hop count is important for controlling the amount of overhead that source routing generates and should be set as low as possible. Most token-ring internetworks require a hop count of six or seven.

Layland is an engineering consultant at The Travelers Corp. in Hartford, Conn.

Campus networks

A common method of interconnecting token rings is often used in multifloor buildings. Token rings installed on each floor are interconnected by a separate ring, called the building ring, which runs through the facility.

If a company has several buildings located on the same corporate campus, a separate ring, called the campus ring, is used to interconnect the buildings. These campus rings are bridged to a single master campus ring, generally located at the company's headquarters.

This setup forms a hierarchical token-ring network in which only one path exists between any two rings.

As more users on the various rings develop the need to share information with one another, routing all traffic through the headquarters ring becomes inefficient. Reliability also becomes an issue: What happens if the connection to the headquarters' ring fails?

One solution is to build a mesh network by adding bridges between the campus rings. Mesh networks have many forms, but the key feature is creating two different paths between campus rings.

However, as a mesh network starts to grow, problems occur. The token-ring network becomes congested with data traffic, which causes messages to be discarded and response time to suffer. Ironically, source routing, a key benefit of token-ring networks, can be

(continued on page 44)

While source routing does have benefits, the overhead that it generates can cripple a net with traffic congestion.

ILLUSTRATION ©1990 DAVE CUTLER

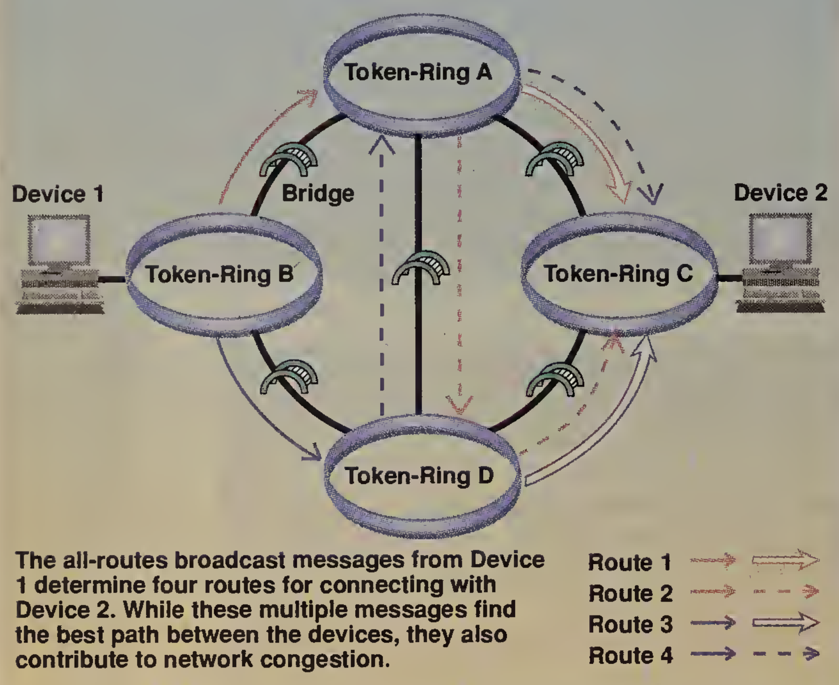
(continued from page 43)

a major contributor to congestion.

In source routing, the originating device locates the target device by sending out broadcast messages. The originator first sends a broadcast message around its own ring. If the target is on the ring, it responds to this message.

The all-routes broadcast method

Figure 1



The all-routes broadcast messages from Device 1 determine four routes for connecting with Device 2. While these multiple messages find the best path between the devices, they also contribute to network congestion.

GRAPHIC BY SUSAN SLATER SOURCE: THE TRAVELERS CORP., HARTFORD, CONN.

If the broadcast message returns without the target responding, the originator then sends out a source routing broadcast message, a copy of which reaches every ring in the token-ring network.

The target sends back to the originator a message containing routing information. If the originator doesn't receive a response, it concludes that the target is not on the token-ring network.

Source routing messages

IBM's Token-Ring Network uses two types of source routing broadcast messages: all routes and single route.

An all-routes broadcast message takes every possible route to reach its destination. A mesh network will cause the destination to receive several copies of the broadcast message, and it responds to each one.

The only rule that an all-routes broadcast message follows is that the message cannot be sent to the same ring twice. This prevents the broadcast message from looping back on itself.

Single-route broadcast messages use a spanning tree structure to guarantee that only one copy of the broadcast message reaches each ring. The token-ring network, via the bridges, is either manually or automatically configured into a spanning tree. The purpose of the spanning tree is not to determine the best route, but to guarantee that each ring receives only one copy of the broadcast message.

The network administrator can manually determine the tree's structure. However, by doing so, the administrator becomes responsible for adjusting the tree if a bridge fails.

The network can automatically build the tree structure, but this entails considerable network overhead and may not work in a network with remote bridges due to timing problems. When a device receives a single-route broadcast message, it responds with an all-routes broadcast message.

With either the all-routes or single-route broadcast method, the originator can receive multiple copies of the returned broadcast messages. The originating device chooses which route to use; all of the current IBM LAN products choose to return via the route used by the first broadcast message.

Source routing in a mesh network

Figure 2

Number of nodes	Maximum number of broadcast messages per connection request	Line utilization			
		9.6K bit/sec	56K bit/sec	128K bit/sec	T-1
5	5	14%	2%	1%	0.1%
6	16	46%	8%	4%	0.3%
7	65	184%	32%	14%	1.1%
8	328	929%	159%	74%	5.8%

Multiple simultaneous connection requests can overwhelm communications lines. These figures represent the worst case scenario for a mesh network with a hop count of seven.

GRAPHIC BY SUSAN SLATER SOURCE: THE TRAVELERS CORP., HARTFORD, CONN.

IBM's Network Basic I/O System uses the single-route method, but IBM Systems Network Architecture products use the all-routes method. Figure 1 on this page illustrates how source routing works using the more common all-routes broadcast method.

The figure shows four token rings networked together with IBM local bridges. Device 1 on Token-Ring B requests a connection to Device 2 on Token-Ring C.

First, Device 1 sends a locate message that circles Token-Ring B looking for Device 2. This locate message is not forwarded by the bridges on Token-Ring B to the other rings. After circling Token-Ring B, the locate message returns to Device 1 and informs it that Device 2 is not on Token-Ring B.

Next, Device 1 initiates a search of the other token rings in the network by sending out an all-routes broadcast message. This message circles Token-Ring B, and the two bridges on Token-Ring B forward copies of the all-routes message to Token-Rings A and D.

To understand how multiple copies of an all-routes message are generated, it is best to follow the broadcast message forwarded from Token-Ring B to Token-Ring A. The forwarded message circles Token-Ring A, and the bridges on Token-Ring A forward copies of the message to Token-Rings C and D.

The message is not forwarded back to Token-Ring B since a bridge will not forward a message back to a ring it has already traversed. To accomplish this, the bridge examines the message's source routing field, which contains a list of the rings the message has traversed.

The message forwarded to Token-Ring D will now have the sequence "Token-Ring B to Token-Ring A to Token-Ring D" in its source routing field. A copy of the message is then forwarded to Token-Ring C but not to Token-Rings A or B, which the source routing field indicates have already been traversed.

When the message forwarded from Token-Ring D reaches Token-Ring C, it locates Device 2, which sends a response to the message by the reverse route: Token-Ring C to Token-Ring D to Token-Ring A to Token-Ring B. The broadcast message that found Device 2 will also be examined by the bridge between Token-Rings C and A, even though Device 2 has already been located.

The bridge between Token-Rings C and A does not forward the message in this case because the source routing field, which now contains "Token-Ring B to Token-Ring A to Token-Ring D to Token-Ring C," indicates that the message has already been to Token-Ring A. If the message hadn't already been sent to Token-Ring A, the bridge would have forward-

(continued on page 48)

Spanning Tree also has a dark side

Both source routing and the Spanning Tree Protocol have problems and, to be fair, we should take a look at some of the negatives of Spanning Tree.

It is well known that Spanning Tree bridges create a loopless network topology with only a single logical path between any two local-area networks.

This fact has been played up as an advantage of the approach, and indeed, it's fine in many situations. But when there's link or node congestion, the simultaneous use of multiple routes may be necessary, and Spanning Tree doesn't allow this.

Alternate routes and backup trunks may just operate in standby mode (they are active only after a primary trunk or bridge has failed), wasting network bandwidth. The Spanning Tree Algorithm automatically uses the bridge addresses to determine which bridge will be the root of the tree.

Depending on the network traffic distribution, however, the choice of root bridge may be poor because network links near the root and the root bridge itself may become severely overloaded. If this happens, the user must manually force the network to select a new root bridge.

The Spanning Tree Protocol is particularly limiting in environments that include LANs interconnected in a wide-area mesh topology, given that much of the traffic must be backhauled through the logical tree's root node.

This adds unnecessarily to network link and node congestion and prevents users from sharing the traffic load across multiple paths. As a result, virtually every remote Spanning Tree bridge vendor has modified its products to deal with these shortcomings, leading to nonstandard remote bridge products that do not interoperate with those of other vendors.

Compared with the Spanning Tree Algorithm, source routing offers the advantage of simultaneously active alternative paths through a network of LANs, which permits load sharing. It also permits each source node to pick the best path to a destination based on its own evaluation criteria, rather than being forced to use the single route the Spanning Tree Algorithm selects.

Depending on the implementation, the best path could be the route with the fewest hops or the least delay. The source node may store alternate routes for use just in case the best path fails or becomes unavailable (detectable through a timer-based protocol).

One might argue that this route selection requires additional processing in end nodes, but such processing is usually handled by the token-ring card, not the main processor.

Source routing bridges require far less processing capability for the forwarding of data packets than Spanning Tree bridges. This is important when developing high-speed LAN bridges such as those based on the Fiber Distributed Data Interface.

Source routing bridges merely inspect the source routing information contained within each packet to determine the next hop, or link, over which the packet should travel.

Theory vs. reality

The often-cited major shortcoming of the source routing algorithm is that in networks with many parallel bridges and large numbers of LANs, the number of broadcast frames required to implement the route discovery process grows exponentially and floods the LANs with overhead traffic.

This flooding is a major reason why, despite IBM's lobbying, the IEEE 802.1 standards committee rejected source routing in favor of the Spanning Tree Algorithm.

While this shortcoming is true in theory, the reality is that organizations are unlikely to implement bridged interconnection networks that contain the number of parallel-connected LANs needed to create excessive route discovery traffic. Any organization with thousands of richly interconnected LANs is more likely to use routers to internetwork its LANs, so performance of source routing bridges in such an environment becomes a moot point.

Bridge products that encompass both Spanning Tree and source routing LAN environments are becoming available. The new source routing transparent standard supports source routing for end nodes that can take advantage of the technology's more advanced capabilities and supports Spanning Tree for the remaining "dumb" end nodes.

Users should be aware of the strengths and weaknesses of each of these two modes of operation.

— David Passmore, partner
Ernst & Young/
Network Strategies
Fairfax, Va.

How many computer trade shows offer you the ultimate opportunity to connect with hundreds of four-star exhibitors showcasing the latest products, programs and services?

And how many provide a Seminar Program with a direct connection to the best in the industry eager to assist with all your networking and connectivity needs?

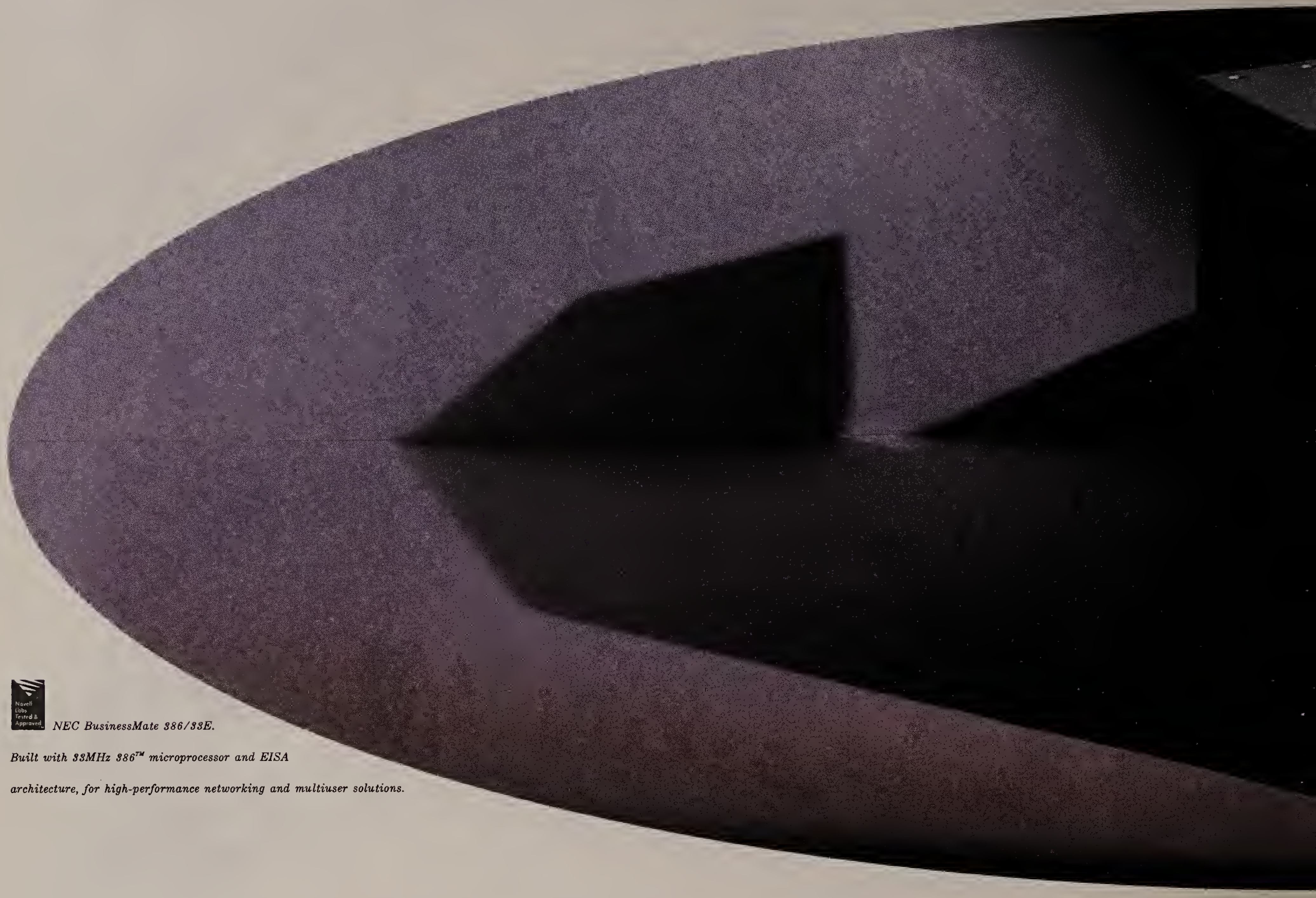
Only one. **NetWorld 91.** The Ultimate Connection.

Hynes Convention Center
February 12-14, 1991
For information on advance registration call today.
800-444-3976

NetWorld is produced by **Bruno Blenheim Inc.**, trade show management, Englewood Cliffs, NJ · 201-569-8542

NetWorld Expositions in the U.S.A. are owned, produced and managed by Bruno Blenheim Inc.
NetWorld is a servicemark of Novell, Inc. licensed exclusively in the U.S.A. to Bruno Blenheim Inc.

Perhaps its best fea



NEC BusinessMate 386/33E.

Built with 33MHz 386™ microprocessor and EISA architecture, for high-performance networking and multiuser solutions.

If you see networking and multiuser solutions in your company's future, there's no better investment than the NEC BusinessMate® 386/33E. Because it gives you the performance, capacity and expandability these environments demand.

It comes with 4MB or 8MB of RAM, a 64KB SRAM cache, and room for three full-height and three half-height storage devices. Its 32-bit EISA architecture accepts 8-, 16- and 32-bit cards among eight

C&C
Computers and Communications

ture is its future.

expansion slots. And its NEC Host Adaptor supports up to seven SCSI devices, for increased flexibility with no sacrifice in performance.

In short, with support for thousands of applications, you'll have the power to make your system grow and change as your needs do. Best of all, you'll have a system that offers something no one else can offer at any price: NEC. Which may be the most attractive feature of all.

For more information, call 1-800-NEC-INFO.

NEC

Fully compatible with The Santa Cruz Operation,® UNIX,® and XENIX® UNIX is a registered trademark of AT&T

XENIX is a registered trademark of Microsoft Corporation

Novell certification mark is a registered trademark of Novell, Inc

386 is a trademark of Intel Corporation

BusinessMate® is a registered trademark of NEC Corporation © 1990 NEC Technologies, Inc

(continued from page 44)

ed the broadcast message even though the broadcast had already reached its destination.

This was just the message that was forwarded from Token-Ring B to Token-Ring A to Token-Ring D. Another copy of the message was forwarded from Token-Ring B to Token-Ring A to Token-Ring C. This message also reached Device 2. The all-routes message will continue circling the ring, even though it has reached Device 2.

The bridge between Token-Rings C and D will see this message and forward it to Token-Ring D since it hasn't been there (its source routing field contained "Token-Ring B to Token-Ring A to Token-Ring C"). When this message reaches Token-Ring D, no bridge will forward it.

The bridge between Token-Rings D and A can't forward the message since Token-Ring A is already in the source routing field ("Token-Ring A to Token-Ring B to Token-Ring D"). The same logic applies to the bridge between Token-Rings D and B.

Two messages reached Device 2 from just the one message that went from Token-Ring B to Token-Ring A, but there was another all-routes message that started from Token-Ring B and went to Token-Ring D. What happened to this message? It followed the same logic at each bridge as did the message from Token-Ring B to Token-Ring A.

> While source routing broadcast messages are small, their numbers can affect remote bridges.
>
> ▲▲▲

The all-routes message from Token-Ring B to Token-Ring D also caused two different copies of the all-routes message to reach Device 2. Thus, Device 2 received four copies of the connection request.

Device 2 returns all four copies of the message to Device 1. Each response returns the same way it came. Device 1 receives all four copies and has four different routes from which to choose to connect with Device 2. While the return messages are not all-routes broadcast messages, they still use network resources.

Source routing's effects

While source routing broadcast messages are small — generally only 30 to 40 characters in length — their numbers can significantly affect remote bridges. Remote bridges are connected by leased lines that can range from 9.6K bit/sec to T-1 rates (1.544M bit/sec).

The throughput of IBM's Token-Ring bridge is approximately 2M bit/sec, but generally, the token-ring adapter or the bridge is not the performance bottleneck; the leased line is.

The four messages to Device 2 in the previous example would consume 5% to 7% of each 9.6K bit/sec line that connects Token-Ring C to both Token-Rings A and D. If multiple connection requests occurred simultaneously, the line utilization would be multiplied. The overall effect can be quite large.

The severity of the effect of source routing on remote bridges depends on two factors. The first is the rate of connection requests, which varies depending on the type of applications that make up the network. It can also be affected by the time of day.

> Generally, the token-ring adapter or the bridge is not the performance bottleneck; the leased line is.
>
> ▲▲▲

When the business day starts, employees arrive and request connections. This produces a surge of connection requests, which could disrupt a network. Surges such as this could be repeated if the network crosses time zones.

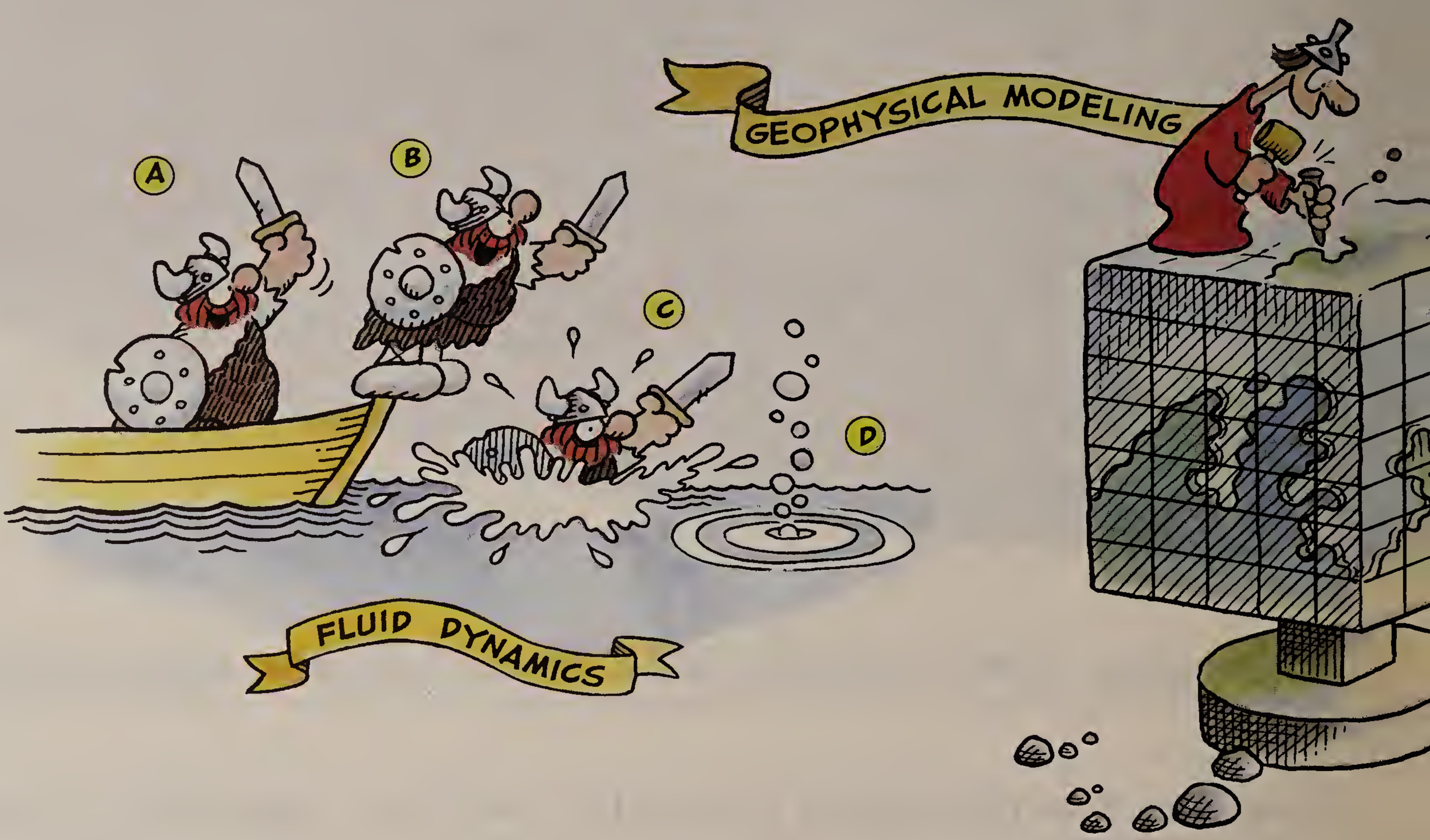
The structure of the token-ring network also affects source routing. A hierarchical network need be concerned only with the rate of connections requested because each connection request will cause only one message to reach each ring.

However, a mesh structure, such as the one described in the example above, multiplies this effect. When building a token-ring network, users must take care to minimize the number of copies of the broadcast message each connection request generates by either limiting the hop count, if possible, or by limiting the way in which rings are interconnected.

Meshed networks

Figure 2 on page 44 shows the worst case effect on a remote bridge between campus rings of a network with a hop count of seven. According to the figure, a mesh network with just six campus rings

The IBM RISC System/
The power you've been seeking



It's a never-ending quest for power seekers. You're always looking for ways to run your favorite applications faster. Well, search no more. The RISC System/6000™ family of POWERstations and POWERservers gives you power that soars as high as 13 MFLOPS and 41 MIPS.

	MFLOPS	MIPS	SPECmark™
POWERstation 320	7.4	29.5	22.4
DECstation 5000-200	3.7	24.2	18.5

When it comes to porting, your ship has come in. Of course, all the speed in the world wouldn't mean much without the applications you need. So the RISC System/6000 family already has more than 1,000 of the most popular applications up, running, and running fast. And because software vendors know a good thing when they see it, more applications are coming on board every day. By the end of the year, there'll be over 1,500 leading technical and commercial packages to choose from. And if you like to build your own solutions, there's a full arsenal of enablers and relational data bases from leading vendors, as well as CASE tools and a host of popular programming languages.

A smorgasbord of solutions. Applications already announced include the IBM engineering design packages CADAM,® CAEDS,® CBDS,®

MFLOPS are the results of the double-precision, all FORTRAN Linpack test 100x100 array suite. The Dhrystone Version 1.1 test results are used to compute RISC System/6000 Integer MIPS value where 1,757 Dhrystone/second is 1 MIPS (Vax 11/780). SPECmark is a geometric mean of ten benchmark tests. All performance data are based on published benchmark information.

IBM is a registered trademark, and RISC System/6000 and CAEDS are trademarks of International Business Machines Corporation. SPECmark is a trademark of Standard Performance Evaluation Corporation. UNIX is a registered trademark of UNIX System Laboratories, Inc. CADAM is a trademark of CADAM INC. CATIA is a trademark of Dassault Systemes. CBDS is a trademark of Bell Northern Research Corporation. DECstation is a trademark of Digital Equipment Corporation. HAGAR THE HORRIBLE Character(s) © 1990 King Features Syndicate, Inc. © IBM Corp. 1990, all rights reserved.

fully interconnected generates a significant number of broadcast messages (16) from one connection request.

For a mesh network with a hop count of seven, only five simultaneous connection requests will overwhelm a 9.6K bit/sec line and consume 40% of the bandwidth of a 56K bit/sec line. As the number of fully meshed nodes increases, the effect increases exponentially.

Hop count can be used in a fully meshed network to limit the effect of source routing overhead. A fully meshed network only needs a hop count of three to allow for alternate routing between any two nodes.

However, most corporate token-ring networks are not simple fully meshed networks. Departmental token rings are often connected to only one campus ring. And while not all campus rings are interconnected, the network still retains a high degree of interconnectivity.

These changes increase the hop count required to allow any-to-any connectivity and still provide alternate paths between any two campus rings. While the source routing overhead may not be as drastic as shown in Figure 2, in many cases, it will be significant.

Making matters worse, source routing generates the most overhead not between the campus rings, but between a campus ring and a departmental ring. A departmental ring connected to a campus ring in a six-node fully meshed network with a hop count of seven would receive 65 source routing broadcast messages.

Two conclusions can be quickly reached. The first is that a fully meshed network generates a significant level of overhead. The second conclusion is that a fully meshed token-ring network requires that *all* of the rings be bridged with high-speed lines, at least 128K bit/sec.

That is significant because it implies that a meshed token-ring network should be built with T-1 or fractional T-1 lines, which is not a low-cost option.

Reducing overhead

By creating a partitioned mesh network comprising two mesh networks connected by two remote bridges, the network designer can build a larger network while possibly limiting the detrimental effects of source routing.

A partitioned mesh design may require a higher hop count than the fully meshed network. A partitioned mesh network comprising two mesh networks, each of which consists of five campus rings, causes the number of messages being sent to a departmental ring connected to just one campus ring to increase from 16 to 152.

However, while the partitioned mesh network greatly increases the number of campus rings in the network, it generates a high level of source routing overhead. Breaking a large mesh network into two smaller mesh networks with only two connections between the meshes doesn't solve the source routing problem.

A better choice may be a limited mesh network in which peripheral token rings may be linked to two main token rings but not to one another. This type of network is suitable for corporations that have two sites at which most of the corporate data is located and several other locations that require access to that data.

In a limited mesh network, if the number of connection requests is relatively low — only one or two per second — 56K bit/sec lines can be used. But an early morning surge of just 10 connection requests per second would bury a 56K bit/sec line. Therefore, even this more limited design requires a network comprising T-1 or fractional T-1 lines.

If a mesh net is required, the interconnected campus rings should be kept to a minimum.

▲▲▲

Drawing conclusions

What conclusions can thus be drawn about designing a token-ring network that minimizes the overhead of source routing? The first is to use a hierarchical design. This prevents multiple copies of the source routing message from being sent to a ring.

If a mesh network is required, then the number of interconnected campus rings should be kept to a minimum. A limited mesh network with just two major campus rings is a good candidate, but it is questionable whether any fully meshed network, except one that is small and simple, would have an acceptable level of overhead.

Another conclusion is that whenever a mesh token-ring network is built, the designer should analyze the effect of source routing on the network design. While the overhead of source routing can be acceptable in some designs, it can quickly rise to an unacceptable level in the majority of mesh network designs.

Source routing has many benefits though. A workstation does not need any knowledge of the network's topology when it requests the route to its target. The bridges also don't have to understand the network's topology, thus simplifying their operation.

Yet source routing's very benefits can generate a high level of overhead, which must be handled by oversizing, or adding extra bandwidth to the net, and that costs money. Net designers must weigh the effects of source routing when determining what is best for their networks. ◪

6000 family. for all your applications.

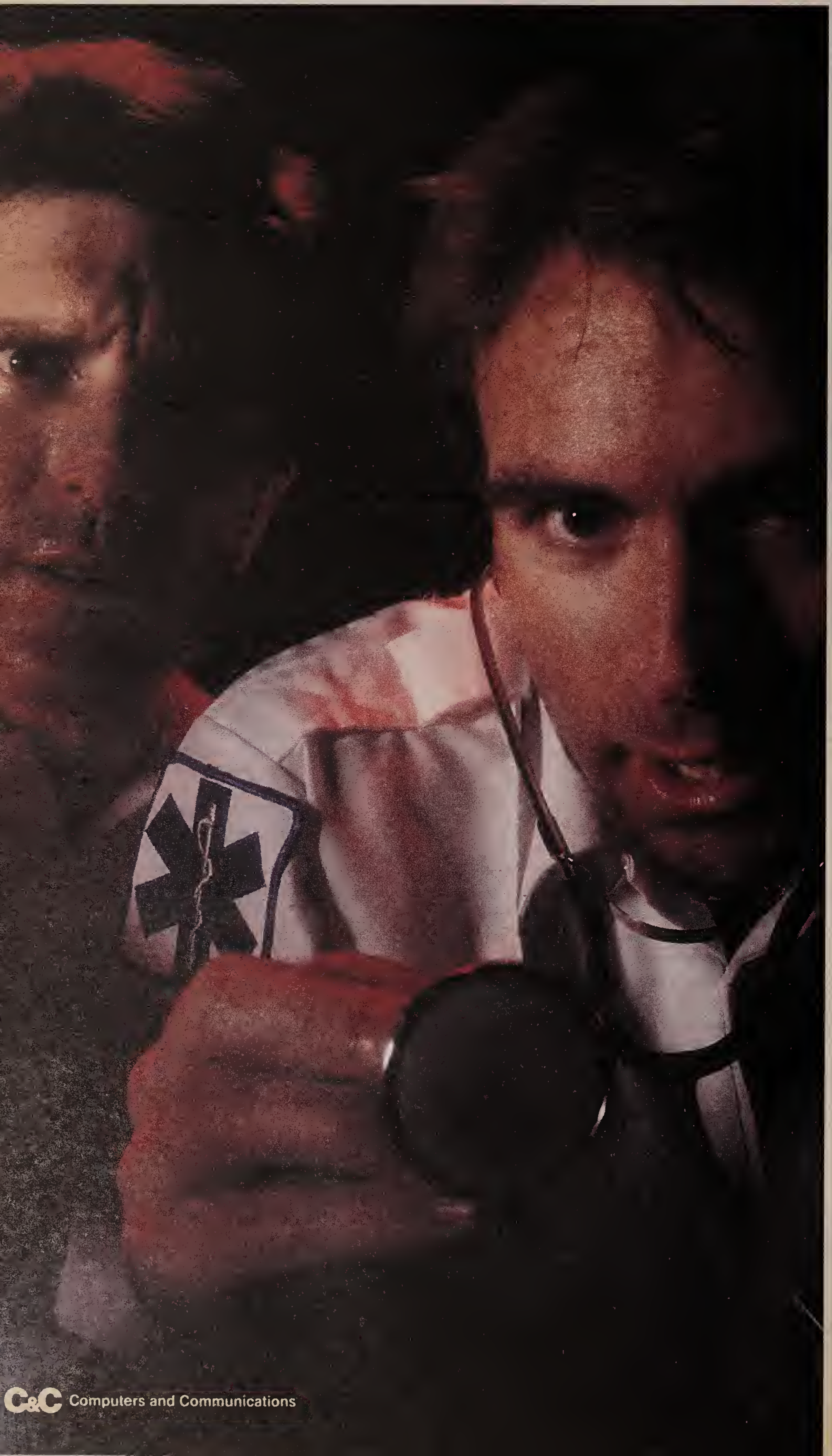
CATIA™ and AES. Also available are a broad spectrum of solutions from vendors like Valid Logic, MacNeal Schwendler, Swanson Analysis, SAS Institute, SPSS, Wavefront, Alias, Polygen, Cadence, Fluid Dynamics International, Western Atlas, ECL Petro and creare.X. Scientific and technical applications are available in areas like physics, structural analysis, chemistry, securities trading, mathematics, earth resources, operations research, visualization, graphics, technical publishing and more. There's also accounting software like FourGen and support for leading UNIX®-based office automation packages. And there are key industry applications for businesses in medical groups, retail stores, newspapers, pharmacies and many more.

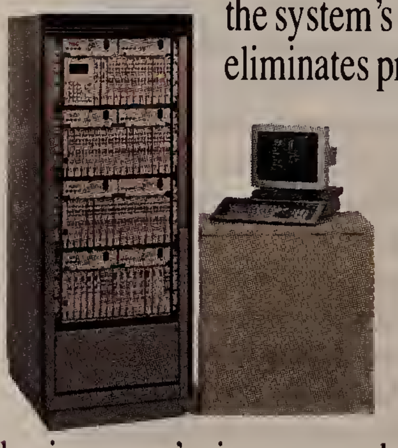
Command enormous processing clout. The RISC System/6000 family is built to boost the performance of the software power seekers use most. It's got the best floating point processor in the business for numerically intensive applications, plus a new superscalar processor and incredible 3D graphics capabilities. To find out more, call your IBM marketing representative or IBM Business Partner. For literature, call 1 800 IBM-6676, ext. 990.

For the Power Seeker.

IBM™

NEC modems keep information moving as if your life depends on it.





In a 911 emergency, to risk a communications breakdown is to risk a life. So if you don't want to take any chances, make sure your modem can handle the pressure in a crisis.

In Florida, NEC's I Series Intelligent Chassis System is now helping coordinate the life-saving efforts of Lake County's 911 services. The county chose the system after tests found NEC's I-Chassis modems outperformed others. And they've proved their round-the-clock reliability by being on the job there for more than a year without a single failure.

Since NEC modems are designed to rapidly and accurately transmit huge volumes of data, Lake County's 911 operators can now quickly pinpoint accident locations, provide traffic instructions, find patient medical records, and dispatch back-ups when needed. And because NEC's Dual Modem Card links 911's control center to NEC Dial-up Modems in remote locations, Lake County feels it has found the best data networking solution attainable.

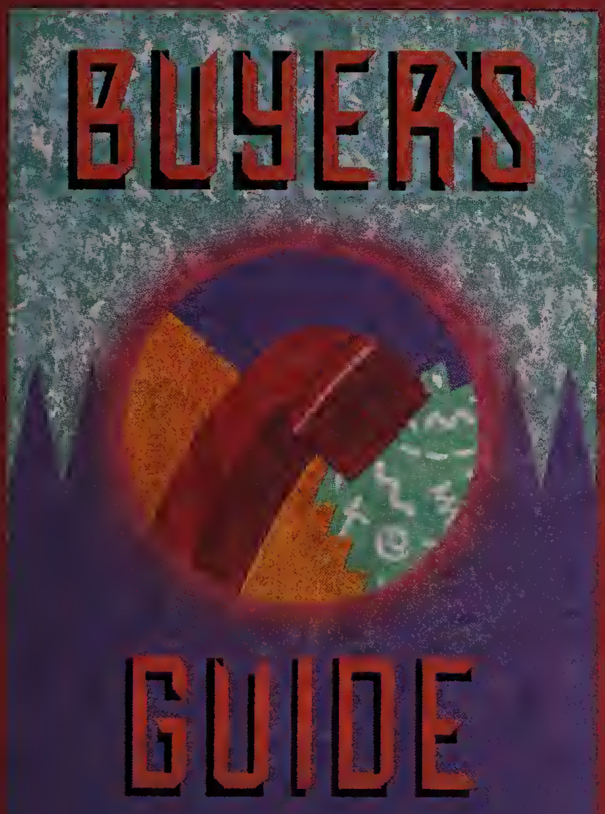
Each individual I Series Chassis supports a wide variety of applications and products. These include synchronous and asynchronous operation in dial-up or leased line networks. Line speeds ranging from 300 bits/s to 56k bits/s with both analog and digital capabilities. As well as compatibility with CCITT standards such as V.32 and V.42/bis. Plus, the system's built-in flexibility eliminates product obsolescence by making it easy to add, mix, and match other chassis and data communications devices as network requirements change.

No matter what business you're in, you need a modem that can keep facts and information on the move without causing a crisis of confidence. So choose wisely. Choose NEC's I Series Intelligent Chassis System and Network Manager. For a free assessment of all your data networking needs, **call (800) 222-4NEC.**

© 1990 NEC America, Inc.

NEC

See The FAXNeT Form on Page 55



METROPOLITAN-AREA NETWORKS

Providing bandwidth on demand

CONTINUED FROM PAGE 1

ternate routing and disaster recovery.

Alternative access carriers

Some of the earliest metropolitan-area networks were created by alternative local transport providers, which mainly built fiber-optic networks alongside local exchange carrier networks in the nation's largest cities.

These local metropolitan-area nets fill the needs of increasingly sophisticated users that want greater reliability, efficiency, economy and flexibility from their local loop provider — the same qualities they receive from their interexchange carriers.

Generically, all alternative local access providers offer similar benefits to users. Among these benefits are:

- **Quality.** In 1989, for instance, Teleport Communications Group in New York claimed it provided 99.99% availability and transmission accuracy exceeding 1 x 10^{-9}. In practice, these rates can reach 1 x 10^{-12}.
- **Price.** While many user firms would pay a premium for alternative access in the local loop, alternative access providers offer rates that are generally at least 10% less than those of the local carrier.
- **Digital services.** Most alternative access services are all-digital, although analog services have been added in some instances, mostly as an afterthought.

Among the most popular

(to page 52)

Briere is president of TeleChoice, Inc., a Montclair, N.J., telecommunications consultancy specializing in long-distance service analysis and network design. He can be reached at (201) 746-0200.

CHART • GUIDE

A Buyer's Guide chart describing metropolitan-area net services from various carriers begins on page 54.

Metropolitan-area nets strive to satisfy users' need for flexibility and reliability at an affordable price.

(continued from page 51)

services are DS0, DS1 and DS3 services, as well as voice-grade private lines, digital data services (DDS) and LAN offerings such as Teleport's LAN Extender Service for interconnection of LANs at speeds up to 6.312M bit/sec.

- **Fiber-optic quality.** For the most part, alternative access metropolitan-area nets use fiber-optic cable, but many frequently use complementary technologies such as microwave to reach outlying sites or places where fiber installation would be too expensive. But some firms, such as LOCATE, Inc. of New York and DigiNet, Inc. of Seattle, are largely digital microwave-based. New England Digital Distribution, Inc. of Wakefield, Mass., uses digital infrared communications.

- **Restoration services.** Eastern TeleLogic Corp. of Philadelphia offers a special disaster recovery service, called LogiCall Secure, in which the user company can have its long-haul access circuit directly wired to the Eastern TeleLogic digital access and cross-connect system (DACS). If long-distance service fails, the user's access may be rerouted to another long-distance carrier in less than 30 minutes.

> Metropolitan-area nets offer services users can't get from their LEC.
>
> ▲▲▲

- **Innovative, hard-to-find services.** In many cases, metropolitan-area nets offer services that users cannot get from their local exchange carrier. In New York, Teleport offers 2.048M bit/sec European T-1 (E-1) connections to its international customers so that they can transmit European-standard high-speed data from New York to Europe without costly translation equipment. Teleport's previously mentioned LAN Extender Service helps companies connect LANs scattered throughout the city without data transmission delays.

Also, several carriers provide fractional T-1 access, which only one Bell operating company — New England Telephone and Telegraph Co. — offers. For instance, Diginet Communications, Inc. of Milwaukee offers 64K bit/sec fractional T-1 service in increments of one to 24 channels.

- **Billing flexibility.** Most of the billing systems of these alternative carriers are new, so they are not hindered by previously programmed or depreciated systems. As a result, customers can expect to get bills in almost any format they want, whether it's electronic or paper-based.

- **Integrated network management.** The metropolitan-area network companies are also trying to be responsive to the network management demands of their users. For instance, National Metropolitan Networks (NatMet), a cooperative group of four alternative access carriers — Teleport; Tampa, Fla.-based Intermedia Communications of Florida, Inc.; Eastern TeleLogic; and McLean, Va.-based Institutional Communications Co. — allows its members to integrate their network monitoring and control functions. Remote telemetry provides monitoring of fiber-optic facilities, transmission equipment, power systems and DACS equipment.

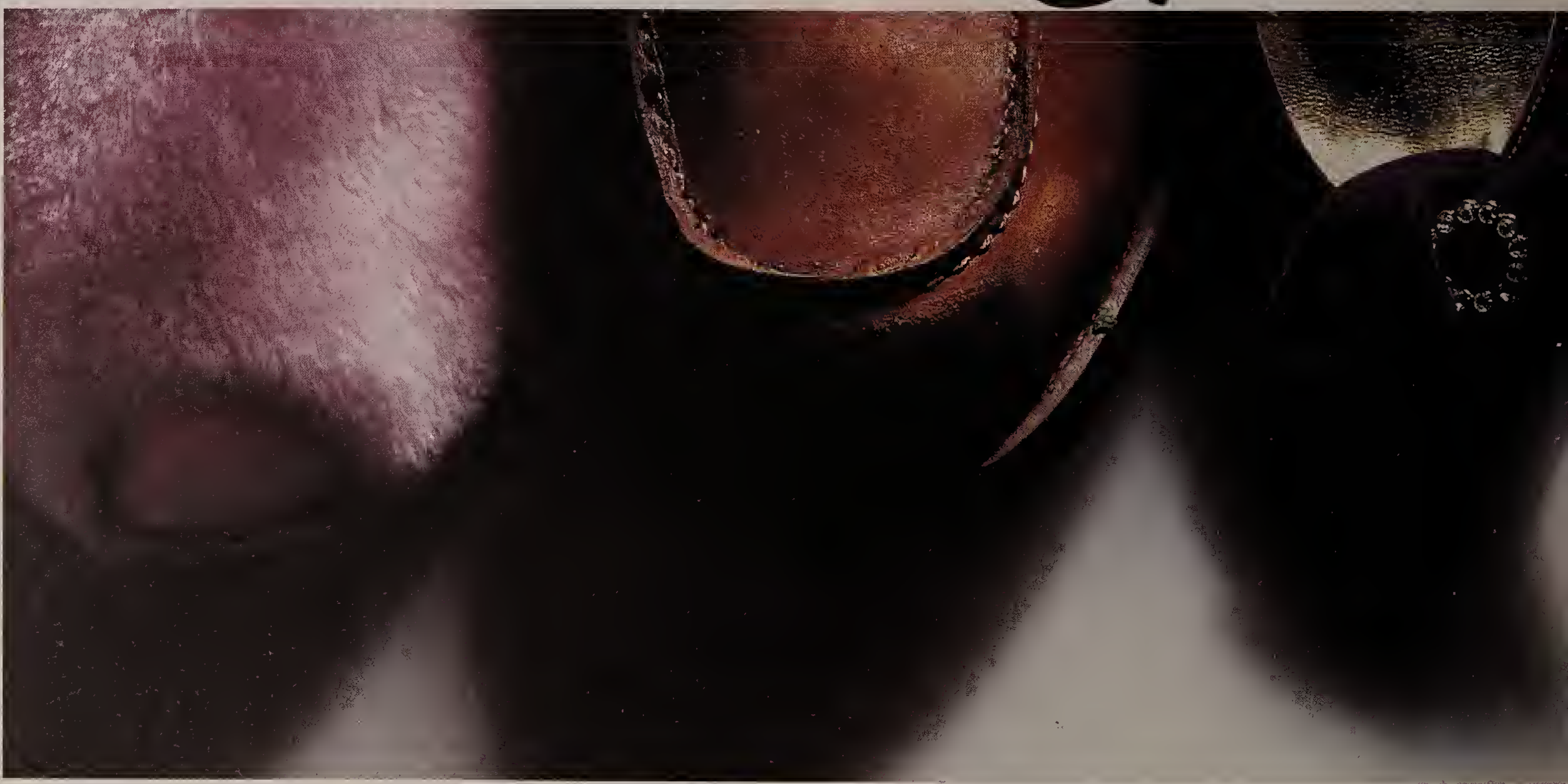
Currently, the NatMet network center in New York handles maintenance calls only during off-hours. During regular business hours, each carrier provides its own network monitoring and management. Remote telemetry can also be extended to customer premises devices.

In some cases, access providers are competing against one another, forcing pricing down to 30% to 50% less than local exchange carrier prices. This is not unrealistic, considering that the alternative access providers have primarily state-of-the-art equipment, which allows them to operate at lower costs. They generally also have much less overhead than local exchange carriers. But it seems likely that in the long term, the alternative carriers will not be able to continue low-ball pricing strategies. A major reason for this is the ongoing efforts

Technology for

Bankers, nuclear physicists, athletes, students and scores more can walk right into a virtual shopping mall of information. How? The answer is an exciting on-line gateway service called NYNEX INFO-LOOK®, developed by our Science & Technology Center.

To enter, all you need is a computer, modem, and a calling card from New England or New York Telephone. It's that simple because we designed special software that allows your computer to interact directly with the database that holds the verification and billing information. So instead of waiting days to receive confirmation and a password by mail, you have only to wait milliseconds.



by the local exchange carriers to upgrade their facilities and cut overhead costs.

Dedicated vs. switched

For the most part, metropolitan-area network providers offer dedicated services — tie lines, off-premises exchanges, point-to-point private lines used for access to other sites or long-distance carriers and so forth. Some alternative access carriers are looking to enter the switched services marketplace but only to the extent of offering switched access alternatives between the customer's serving central office and the long-distance carrier's point of presence (POP).

Under the current LAN configuration of the local exchange carriers, equal access (or switched) customer traffic can be routed through several offices on the way to the presubscribed carrier's POP. Teleport, Metropolitan Fiber Systems, Inc. (MFS) and others want to collocate their equipment in their customers' serving central offices and offer an alternative switched path to the interexchange carrier's POP.

In June, MFS petitioned the FCC to allow it and other alternative access providers to do just that. The FCC is still considering the matter.

While a central office fire would probably shut down both the local exchange and alternative access facilities, alternative access facilities offer a buffer against an outage between the serving central office and the POP.

Some alternative local access providers are exploring long-term plans for adoption of the IEEE 802.6 metropolitan-area net standard in their local LANs, but none are actively considering it for the short term. In general, however, most are not interested in pursuing high-speed switched metropolitan-area network services as described in IEEE 802.6. The 802.6 standard is concerned with providing greater switched data connectivity than the alternative access providers are prepared to offer on a switched access basis.

For the regional Bell holding companies, the move to switched services in the local exchange is a matter of continued expansion. With extensive user demand for faster switched services, route diversity and network redundancy, the RBHCs are rapidly installing multilayered, fiber-optic facilities in major U.S. cities — fiber-optic rings that will form the physical layers for future BOC metropolitan-area net services.

Some alternative access providers are exploring adoption of IEEE 802.6.

▲▲▲

The RBHCs hope to integrate their existing dedicated overlay networks into the public switched networks through use of the Synchronous Optical Network (SONET) standard — a circuit-switching technology — and the Asynchronous Transfer Mode packet-switching approach currently being standardized. Use of such technologies would allow speeds of more than 100M bit/sec over the local loop within the next five years.

The 802.6 standard

Under development since the early 1980s, the IEEE 802.6 standard is built around a Distributed Queue Dual Bus (DQDB) architecture that consists of two counterrotating rings. Each ring operates independently, transmitting in one direction only (see graphic, page 60).

DQDB is specially designed for redundancy. The DQDB cells, which are 48-byte minipackets, are also called time slots because of their fixed length. Their 48-byte length is equivalent to the cell length specified in the current broadband Integrated Services Digital Network standards.

The 48-byte cell size is important because it permits standardized interconnection with future interexchange carrier wide-area network offerings. The 802.6 standard intentionally mimics the broadband ISDN cell struc-

(continued on page 57)

all walks of life.

The software is so successful, we're offering it to other telephone companies for their gateway services.

The NYNEX® family of companies can offer you everything from network services and software to computers and systems integration. So call us at 1 800 535-1535.

It's a step in the right direction.

Need to communicate? Need to compute? The answer is

NYNEX®

© 1990 NYNEX Corporation.

Metropolitan-area networking services (continued on page 57)

Company	City	Year operational	Network composition	Route miles covered	Number of buildings covered	Carriers accessed	Services offered
Bay Area Teleport **Alameda, Calif.** **(800) 621-5003**	Davis, Mountain View, Napa Valley, Oakland, Rancho Cordova, Sacramento, San Francisco, San Jose, Santa Clara, Santa Cruz, Santa Rosa	1987	80% microwave, 20% fiber	340	21	AT&T, Cable & Wireless Communications, Inc., Communications Transmission, Inc., MCI Communications Corp., Metromedia-ITT Long Distance, Metropolitan Fiber Systems, Inc., Teleconnect Co., Teleport Communications Group, Telesphere International, Inc., Transtel, US Sprint Communications Co., Western Tele-Communications, Inc.	DS0, DS1, DS3
DigiNet, Inc. **Seattle** **(800) 223-6893**	Primary and secondary cities in Idaho, Oregon and Washington	1987	Digital microwave	Not applicable	Bypass circuits offered on an individual business-by-business basis, instead of a geographic or building basis	AT&T, MCI, Metromedia-ITT, US Sprint, Williams Telecommunications Group, Inc., as well as most other carriers serving the area	T-1, T-3, multiplexed T-1
Diginet Communications, Inc. **Milwaukee** **(312) 663-8200**	Chicago, Milwaukee	1985	Fiber optic, uses digital microwave for individual cases only	Chicago: 3.5; Milwaukee: 4	Chicago: 14; Milwaukee: 8	AT&T, Allnet Communication Services, Inc., American Sharecom, Inc., Cable & Wireless, Charter Network/LiTel Telecommunications Corp., Communications Transmission, Conference Call USA, Consolidated Network, Inc, Contel ASC, Datanet Communications, Diginet Communications, Digital Signal, Inc., Lightnet, LiTel; Logicall Communique, Long Distance USA, MCI, Metromedia-ITT, Norlight, Qwest, Inc., Rochester Communications, Inc., Schneider Communications, Telesphere International, Telecom*USA; US Sprint, Western Union Corp., Williams Telecommunications	DS0, multiplexed DS1, DS1, DS1 hubbing, DS3, DS3 hubbing
Eastern Telelogic Corp. **King of Prussia, Pa.** **(215) 337-8899**	Southern New Jersey, southeastern Pennsylvania, Philadelphia	1989	Fiber optic	108	250	Allnet, American Longlines, AT&T (all 3 greater Philadelphia points of presence), Cable & Wireless, Contel ASC, Communications Transmission, Consolidated Network, Digital Signal, Eastern Microwave, Inc., LiTel, MCI, Metromedia-ITT, National Telecommunications Network, Inc., Rochester Communications, Qwest, Southernet, Inc., Teleconnnect, Telesphere, US Sprint, Williams Telecommunications	Off-premises exchange, 4-wire tie lines, analog data circuits, DDS, DS1, DS3, custom hubbing, switched services
Indiana Digital Access **Indianapolis** **(317) 632-2288**	Indianapolis	1987	Fiber optic	50	5	Allnet, Consolidated Network, GTE Corp., Litel, MCI, One Call Communications, Inc., Qwest, Williams Telecommunications	Carrier-to-carrier DS3, intra-LATA private-line premise-to-premise under pending government approval
Institutional Communications Co. **McLean, Va.** **(703) 506-2030**	Suburban Maryland, northern Virginia, Washington, D.C	1986	Fiber optic	150	293	All 23 Washington, D.C. long-distance carriers	Dedicated data services at speeds of 2.4K, 4.8K, 9.6K, 19.2K, 56K and 64K bit/sec; DS0, DS1, DS2 and DS3 service
Intermedia Communications of Florida, Inc. **Tampa, Fla.** **(813) 621-0011**	Miami, Orlando, Tampa	1988	Fiber optic	122	73	All 17 carriers available in Florida	DS0, channelized DS1, DS1, channelized DS3, DS3
LOCATE, Inc. **New York** **(212) 509-5115**	Baltimore, Boston, Chicago, New York and Washington, D.C. on a network basis and 65 other metropolitan areas across the U.S. for point-to-point bypass and custom networks	New York: 1983; Boston, Chicago and Washington, D.C./ Baltimore: 1989	Digital microwave	Not applicable	New York: 80; Chicago: 15; Boston: 10; Washington, D.C./Baltimore: 30; LOCATE also does private point-to-point services on a customer-specific basis	All major carriers	DDS equivalent DS0, DS1, DS3, fractional DS1
Metropolitan Fiber Systems, Inc. **Oakbrook Terrace, Ill.** **(708) 218-0007**	Baltimore	1989	Fiber optic	Proprietary	25	Allnet, AT&T, Cable & Wireless, Capital Telecommunications, Inc., Communications Transmission, Contel ASC, Digital Signal, Long Distance Service of America, MCI, Mid Atlantic, Rochester Communications, Telecom*USA, Telesphere, US Sprint, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Boston	1989	Fiber optic	Proprietary	29	AT&T, Cable & Wireless, Communications Transmission, Contel ASC, Digital Signal, Eastern Microwave, First Phone, Inc., Litel, MCI, Metromedia-ITT, Qwest, Rochester Communications, Telecom*USA, Transpoint Communications, Inc., US Sprint, Williams Telecommunications, Yankee Microwave, Inc.	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Chicago	1988	Fiber optic	Proprietary	45	Allnet, AT&T, Cable & Wireless, Charter Network, Consolidated Network, Contel ASC, Digital Signal, Litel, MCI, Metromedia-ITT, MidAmerican Communications Corp., Midwestern Relay Co., Norlight, Overseas Transmission, Inc., Qwest, Rochester Communications, Telecom*USA, Telesphere, TRT Telecommunications Corp., US Sprint, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Houston	1990	Fiber optic	Proprietary	35	Advanced Telecommunications Corp./Claydesta Communications, Allnet, American Telco Network Services, Inc., AT&T, Cable & Wireless, Contel ASC, Digital Signal, Metromedia-ITT, Qwest, SP Telecom, Telecom*USA, US Sprint, VYVX Telecom, Inc., Williams Telecommunications, World Communications, Inc.	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Los Angeles	1990	Fiber optic	Proprietary	32	Allnet, Associated Communications of LA, AT&T, Cable & Wireless, ComSystems, Contel ASC, Digital Signal, Litel, Long Distance USA, MCI, Metromedia-ITT, M-Tel, SP Telecom, Inc., Technet, Telecom*USA, Telesphere, US Sprint, Western Tele-Communications, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Minneapolis	1990	Fiber optic	Proprietary	17	Allnet, American Sharecom, AT&T, Automated Communications, Inc., Cable & Wireless, MCI, Metromedia-ITT, MidAmerican, Midwest Relay, Norlight, Telecom*USA, US Link, US Sprint, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1

DDS = Digital data service

This chart includes a representative selection of vendors in the metropolitan-area networking services market. Most vendors offer other metropolitan-area networking services, and many vendors not included offer a full range of competitive services.

SOURCE:TELECHOICE, INC., MONTCLAIR, N.J.

This week's FAXNeT ADVERTISERS

FAXNeT is a service designed to help readers of *Network World* gather important information via FAX on products and services advertised in *Network World*.

How to Use FAXNeT

Listed below in the FAXNeT Directory are the FAX numbers of participating advertisers in this week's issue of *Network World* and the page number where the ad appears. To use FAXNeT cut out the FAXNeT form and make a copy of the form for each inquiry you want to make. Then just FAX it to the vendor's number listed in the FAXNeT Directory.

Benefits to the *Network World* Reader

FAXNeT is designed to get you product and service information FAST. And, if your request is urgent and requires an immediate response from the vendor just check the "Urgent" Box.

Company	Page
Banyan Fax: 508-898-1755	7
Bell South Fax: 404-876-9575	45
DCA Fax: 404-442-4368	32
Farallon Computing Fax: 415-841-5770	80
Fujitsu BCS Fax: 602-921-4800	3
GTE Data/OS Systs Fax: 214-718-2426	71
ICA Fax: 214-233-2813	70
Larse Fax: 408-986-8690	76
NEC Modem Fax: 408-433-1239	50
Netronix Fax: 707-763-6291	10
Racal Quanta Fax: 714-779-2863	77
Racal Vadic Fax: 408-432-0188	36
Storage Dimensions Fax: 408-879-9330	74
SynOptics Fax: 415-967-8710	20
Tel. Training Monthly Fax: 215-598-7690	67
Telebit Fax: 408-734-3333	18-19
Teletutor Fax: 603-433-2260	67
Telco Systems Fax: 415-656-3031	16
3Com Fax: 408-764-5001	22-23
UniForum Fax: 708-299-1349	67
US Sprint Fax: 703-689-6998	5
WorldCom Fax: 212-607-2274	33
World Expo Corp Fax: 508-872-8237	12, 74

NETWORK WORLD
The Newsweekly of User Networking Strategies

FAXNeT

Attention: Marketing Communications Manager

Subject: This inquiry was generated by a *Network World* reader who is responding via FAX to your advertisement in *Network World*.

Name ______________________ Title ______________
Company/Div ______________________
Address ______________________
City ______________ State ________ Zip ________
Phone ______________ FAX ______________

☐ **URGENT**

Action Requested
- ☐ Request for Sales Call
- ☐ Request for Proposal
- ☐ Request for Information

Purchase Timeframe
- ☐ Within 60 Days
- ☐ Within Six Months
- ☐ Within One Year

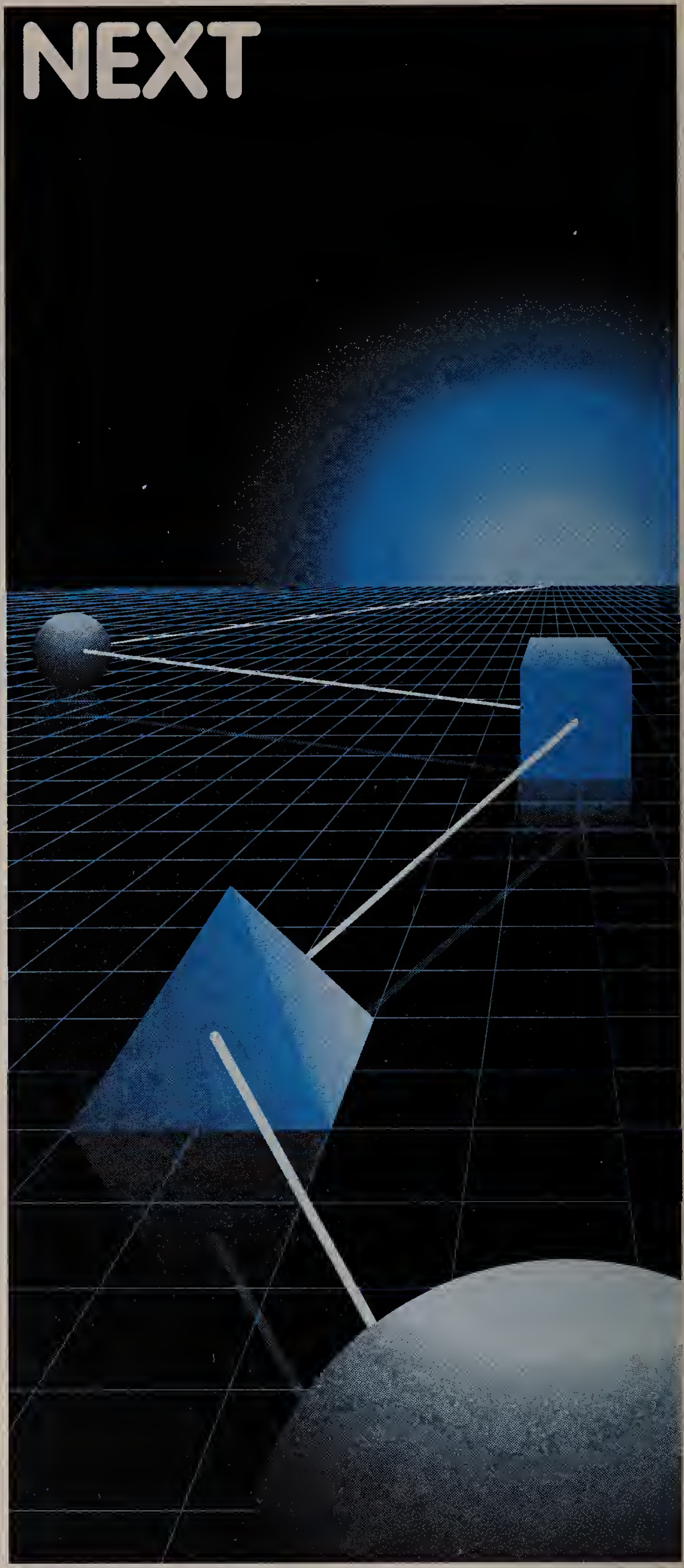
Scope of Purchase Responsibility
- ☐ Enterprise Wide
- ☐ Departmental

Purchase Influence/Number of Sites
- ☐ One Site
- ☐ 2-9 Sites
- ☐ 10-20 Sites
- ☐ 21+ Sites

Product Advertised: ______________________

Intended Application: ______________________

HOW TO CROSS THE NEXT NETWORK FRONTIER



Learn from the people who have been there before...

NETWORK COMPUTING FORUM

January 28-31, 1991 • Grand Hyatt • Washington, DC

Designing or managing distributed computing systems? You're crossing into challenging territory, which only a few trail-blazers have ever explored.

If you're responsible for interconnected networks and applications developed and delivered over diverse platforms and architectures, then **Network Computing Forum (NCF)** can provide you with the information, the resources, and the contacts to get the job done right.

NCF will bring you face-to-face with the pioneers – the most successful leading-edge users, strategists and integrators of network computing. They'll **share their experiences with you** ... and point you toward the most effective solutions for managing mission-critical network applications.

Where is systems management heading?

Avoid costly mistakes! At **NCF** you'll benefit from the most authoritative and innovative thinking on –

- how to select and implement internetworking architectures
- where open systems are going, and how they will impact software development and information management in your organization
- why new partnerships – between vendors, between users, between MIS and corporate users – will make all the difference in building cost-effective applications
- important trends in hardware and software platforms, client server architectures, distributed databases, electronic messaging, and more.

This unique, high-level educational forum will broaden your knowledge base – case studies offering practical advice for advancing your network systems ... intensive short courses with experienced professionals ... panel discussions and workshops focusing on user experiences.

Plus, a select group of leading manufacturers will have technical experts on hand to demonstrate their latest technology, discuss your requirements and answer your questions on compatibility, service, applications, and more.

Act now

Be prepared to cross the next network frontier ... with strategies and solutions that work!

For fastest action, **fax the coupon at right to 508-872-8237**.

NETWORK COMPUTING FORUM

☐ **YES,** please rush me a complete Conference Program.

☐ I cannot attend now, please keep me informed about future NCF events.

☐ I'm interested in exhibiting, please send me more information.

Name ______________________________

Job Title ______________________________

Company Name ______________________________

Address ______________________________

City ____________________ State ___ Zip ________

Phone Number (___) ________________ NWW2

MAIL To: Network Computing Forum, P.O. Box 9107 Framingham, MA 01701-9107

NETWORK WORLD

Metropolitan-area networking services (continued from page 54)

Company	City	Year operational	Network composition	Route miles covered	Number of buildings covered	Carriers accessed	Services offered
Metropolitan Fiber Systems, Inc. (continued)	New York	1990 (November)	Fiber optic	Proprietary	71	All carriers	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Philadelphia	1989	Fiber optic	Proprietary	23	Allnet, American Long Lines, AT&T, ATX Telecommunications Services, Inc., Cable & Wireless, Chadwick Communications, Inc., Communications Transmission, Digital Signal, Eastern Microwave, MCI, Qwest, Metromedia-ITT, Rochester Communications, Telecom*USA, Telesphere, US Sprint, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	Pittsburgh	1990	Fiber optic	Proprietary	26	Allnet, AT&T, Communications Transmission, Digital Signal, Eastern Microwave, Globenetok, MCI, Metromedia-ITT, Qwest, Rochester Communications, Transpoint, US Sprint, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
	San Francisco	1990	Fiber optic	Proprietary	36	Allnet, AT&T, Bay Area Teleport, Cable & Wireless, Communications Transmission, ComSystems, Contel ASC, Express Tel, Litel, MCI, Metromedia-ITT, Technet, Telecom*USA, TeleMarketing Corp., Transpoint, US Sprint, Williams Telecommunications	Local DS0, 2- and 4-wire DS0, DS1, multiplexed DS1, DS1 hubbing, DS3, DS3 hubbing, DDS in speeds of 2.4K, 4.8K, 9.6K, 19.2K or 56K bit/sec, fractional T-1
New England Digital Distribution, Inc. Wakefield, Mass. (617) 245-5678	Boston	1990	Fiber optic	7	14	AT&T, Cable & Wireless, MCI, Metromedia-ITT, US Sprint	T-1, T-2, T-3, dark fiber, multiplexed T-1/T-3
Teleport Communications Group Boston (617) 426-2792	Boston	1989	Fiber optic, digital microwave	8	22	All major carriers	All DDS speeds; manual or automatic ringdown, 2- or 4-wire connection; fractional DS1, available in multiples of 56K or 64K bit/sec; DS1; DS3; E-1; LAN Extender, 6.31M bit/sec
Teleport Communications Group Chicago (718) 983-2125	Chicago	1990	Fiber optic	1 (15 planned; target date of completion: fourth quarter, 1990)	15	All major carriers	All DDS speeds; manual or automatic ringdown, 2- or 4-wire connection; fractional DS1, available in multiples of 56K or 64K bit/sec; DS1; DS3; E-1; LAN Extender, 6.31M bit/sec
Teleport Communications Group Houston (713) 752-0122	Houston	1991	Fiber optic	7	10	All major carriers	All DDS speeds; manual or automatic ringdown, 2- or 4-wire connection; fractional DS1, available in multiples of 56K or 64K bit/sec; DS1; DS3; E-1; LAN Extender, 6.31M bit/sec
Teleport Communications Group Los Angeles (213) 896-0000	Los Angeles	1991	Fiber optic	6.3	5	Most major carriers	All DDS speeds; manual or automatic ringdown, 2- or 4-wire connection; fractional DS1, available in multiples of 56K or 64K bit/sec; DS1; DS3; E-1; LAN Extender, 6.31M bit/sec
Teleport Communications Group San Francisco (415) 989-8273	San Francisco	1991	Fiber optic	11.5	14	All major carriers	All DDS speeds; manual or automatic ringdown, 2- or 4-wire connection; fractional DS1, available in multiples of 56K or 64K bit/sec; DS1; DS3; E-1; LAN Extender, 6.31M bit/sec
Teleport Communications Group Staten Island, N.Y. (718) 983-2000	Northern New Jersey, New York, Staten Island	1984	Fiber optic	258	162	All major carriers	All DDS speeds; manual or automatic ringdown, 2- or 4-wire connection; fractional DS1, available in multiples of 56K or 64K bit/sec; DS1; DS3; E-1; LAN Extender, 6.31M bit/sec

DDS = Digital data service

This chart includes a representative selection of vendors in the metropolitan-area networking services market. Most vendors offer other metropolitan-area networking services, and many vendors not included offer a full range of competitive services.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 53)

ture (see "The DQDB architecture," page 60).

Architecture is a key element in metropolitan-area networks. Although the RBHCs have adopted 802.6, the alternative access providers are more or less ignoring it.

MFS, for instance, uses a combined ring and star architecture that offers the redundancy and route diversity of a ring architecture, and the rapid service expansion and centralized monitoring of a star network.

The ring element of the network comprises two counterrotating rings that circle each city in which MFS offers service. If a break occurs on the primary ring, traffic is instantly switched to the other ring. The star element branches off into connecting spokes to nearby buildings from sections of this ring backbone.

Other architectures that were popular several years ago are still operating within the metropolitan-area net industry. The daisy-chain bus, for instance, connects each building to another in a series. However, if a failure occurs along the path, several buildings could lose service. The same is true of hub point architectures in which many buildings are hubbed together for connection to a network. If a failure occurs on the link to the hub, all of the hub sites are affected.

Over time, these alternative architectures are being phased out or enhanced with redundant facilities.

The future of MANs

Metropolitan-area nets will continue to grow in breadth and in depth. Competition will get more heated between the local exchange carriers and the alternative access providers. Although reluctant in the past, a number of sideline observers such as cable TV firms may decide, in time, to offer telephone access services.

The entry of the alternative access providers into switched services bears close watching. Teleport, for instance, bought Merrill Lynch & Company, Inc.'s AT&T 5ESS switches earlier this year. These switches will allow the firm to provide several flavors of switched services. Exactly what form these services will take, however, remains to be seen.

(continued on page 60)

90 AT&T

Is your fractional T-1

Only AT&T ACCUNET® Spectrum of Digital Services offers you the exact capacity and bandwidth you need to more than 500 locations nationwide.

Choose AT&T as your fractional T-1 vendor and you won't be locked into a network that limits your options. Because with more than 500 locations nationwide, AT&T's ACCUNET Spectrum of Digital Services (ASDS) gives you the freedom to send voice, data and images to more locations than anyone else.

And that's not the only way you benefit from ASDS' extensive network. Along with more locations, we also have many more back-up routes available through our diversity options. Which means ASDS can also provide protection for your critical applications like no one else.

For most businesses ASDS' extensive network translates into lower access charges, too. That's because we're closer to more customers than our competitors.

You won't find an easier service to hook into, either.

network too confining?

Whether you have Analog Voice Grade Private Line, ACCUNET T1.5 or single channel digital access at 9.6 or 56 kbps, getting access to ASDS couldn't be simpler.

So if you're feeling cramped by your network's reach, give us a call. We've got just the thing to break you out.

Service.
Another AT&T advantage.

For more information on AT&T's ACCUNET Spectrum of Digital Services, call your AT&T Account Executive or 1 800 247-1212, Ext. 107.

AT&T
The right choice.

(continued from page 57)

Certainly, the alternative access market will continue to consolidate. Many announced networks have been scrapped, and a number of firms have been swallowed up by other access companies. Strategic marketing alliances such as NatMet will create a national presence for several firms. MFS' desire to expand rapidly across the U.S. by itself is on track; however, revenues in the initial cities will be the key to future expansion.

Much of the future of alternative access metropolitan-area nets is tied to regulation, primarily on the alternative access carriers' attempts to get equal interconnection in the local loop. If the MFS action before the FCC is successful, it will have far-reaching effects for all alternative access metropolitan-area nets nationwide, allowing them to provide alternatives to both switched and dedicated access for their interexchange carrier and end-user clients.

Rulings on the state level, such as the New York Public Service Commission's action last year ordering New York Telephone Co. to provide Teleport with collocation, are pushing the market in this direction. But the FCC decision is seen as the dominant factor in future collocation action.

Someday, the RBHCs will move into the long-distance market. When that happens, the alternative access carriers will be able to position themselves more favorably as strategic partners with the interexchange industry. The long-distance carriers certainly wouldn't want to fuel their new RBHC competitors by providing them with access revenues. Also, the need for redundant facilities, alternative routing and carrier diversity will ensure the long-term viability of alternative access providers, at least in the major end-user markets.

The RBHCs will have to blunt the competitive threat from the local alternative access carriers by becoming more responsive and innovative.

To their credit, the RBHCs are trying. In September, Bell Atlantic Corp. integrated its interexchange market management, sales, product planning, product implementation and customer contact functions under one organization — interexchange access services.

Though the RBHCs would like to say that they have more sophisticated local-area services than the alternative access carriers, this is debatable for now.

One unpredictable area is the rollout of the RBHC metropolitan-area net-based services themselves, such as Switched Multimegabit Data Service (SMDS). As SMDS moves from the laboratory to the network environment, problems might push back current schedules, making the private-line-based alternative access providers a very attractive proposition for the local users.

Standards might also be a problem for SMDS. While SMDS specifications are available from Bell Communications Research, the service itself has not been proposed as an ANSI standard. Still, initial trials are being based on the standards that do exist; the RBHCs want to avoid developing their final products around standards that will change before the services reach maturity.

Someday, the RBHCs will move into long distance.

▲▲▲

Frame relay-based metropolitan-area nets — albeit operating at T-1, not T-3 speeds — will see use in 1991 and will satisfy the near-term needs of the switched data marketplace. The technology has seen substantial activity in recent months, with product announcements from customer premises equipment and public and private networking vendors and with multivendor support for a common frame relay implementation specification.

Frame relay services will satisfy many users' needs until the first SMDS services start to be tariffed, which is expected in 1991. Very high-speed users will migrate to these services.

By 1992, SDMS access channel speed is expected to migrate up to SONET Optical Carrier-3 speeds of 150M bit/sec, with the public network operating at speeds as high as SONET OC-12, or 600M bit/sec. But it will not be until the mid-1990s that metropolitan-area nets will be able to migrate to Asynchronous Transfer Mode cell-based switching technology, through interfaces with optical broadband switches.

Standards also might be a problem for SMDS.

▲▲▲

Some of the early RBHC pioneers are already playing with these advanced protocols in early metropolitan-area net trials. Bell Atlantic's first metropolitan-area net trial in Philadelphia, for instance, is already testing a version of the Asynchronous Transfer Mode standard for carrying traffic. The trial involves carrying customer traffic between two LANs running both Ethernet and token-ring LAN formats. The metropolitan-area net doesn't convert these two protocol formats; instead, it uses a draft version of the Asynchronous Transfer Mode standard.

The growth of the local public network will lead to greater services for the end user. The Consultative Committee on International Telephony and Telegraphy is now working on a specification for broadband ISDN, the next step beyond SMDS as far as user-to-network services go. However, broadband ISDN will not be commonly available until the mid-1990s.

In the end, it is debatable who needs SMDS more — the local exchange companies, which are battling against the alternative access carriers and are trying to keep users on the public switched network, or the users, who have bandwidth-intensive applications to support.

The evidence seems to support the contention that the local carriers have the most to gain by implementing metropolitan-area net-based services. Using current private-line technologies, users have a range of options for interconnecting LANs. The costs are not as expensive as the local carriers have led many to believe, especially when taking alternative access pricing into account.

The onus will be on the RBHCs to convince private network users that the switched alternative is ready, reliable and economical. This may prove to be quite a task. ◘

Distributed Queue Dual Bus

The IEEE 802.6 metropolitan-area network standard is based on a packet-switched, dual counterrotating ring architecture, known as Distributed Queue Dual Bus (DQDB) Network Architecture (see graphic). The 802.6 metropolitan-area net standard specifies a minipacket called a "segment" in 802.6 and a "cell" in broadband Integrated Services Digital Networks. Traditional packets are broken into these segments for transmission.

The two DQDB rings are separate from each other and transmit data in one direction only. Since network nodes are tied to each logical bus, each node is located both upstream and downstream from other bus nodes.

If one of the rings fails, the other can take over transmission of packet data. If one node on the net fails, the 802.6 standard allows the next node in line to assume frame generation.

DQDB technology revolves around the fact that all stations have knowledge of the frames queued at all other stations. This is in contrast to IEEE 802.3 (relying contention) and 802.5 (token passing).

Under DQDB, the network end nodes continuously transmit empty data frames around each ring. Whenever a station on one of the network nodes has a packet to send, it generates a frame request on the bus that is carrying traffic away from its node. Stations upstream receive the request and reserve an empty frame for that station's data, when the packet stream circles around again, for transmission to its destination.

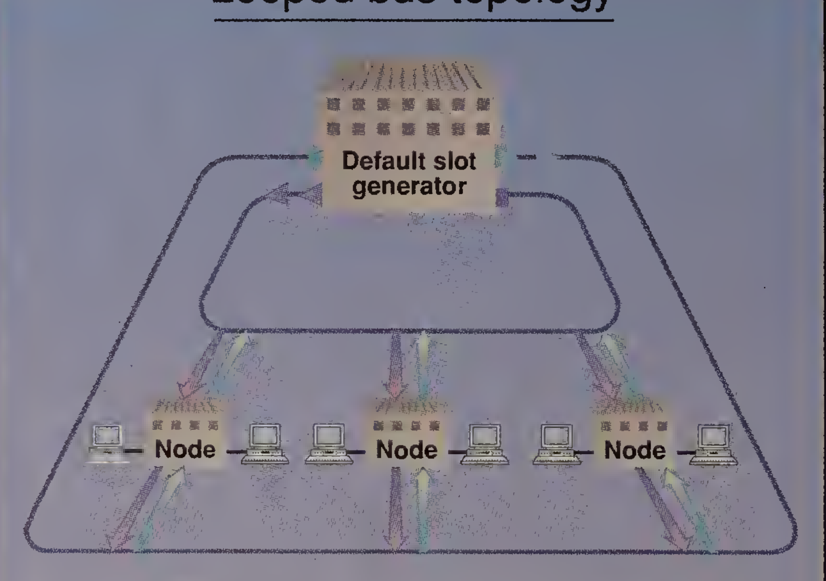
SMDS offers high-speed on-demand data transport for a number of applications.

▲▲▲

If fallback security is required, a DQDB network can be configured as a "looped bus," in which the two ends of the buses are collocated. If a fault occurs in one of the buses, the nodes at either end of the fault become the beginning and the end.

The regional Bell holding companies are not required to use DQDB as the underlying technology for Switched Multimegabit Data Service (SMDS). In fact, other methods of transport are under development. However, DQDB is acknowledged to be the best existing technology and certainly outperforms Fiber Distributed Data Interface in wide-area networking applications.

Looped bus topology



The current metropolitan-area network standard uses a Distributed Queue Dual Bus architecture comprising separate counterrotating rings. If one ring fails, the other can assume data transmission.

GRAPHIC BY SUSAN SLATER

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

SMDS offers a range of high-speed on-demand data transport for a number of applications, including:

■ **LAN-to-LAN interconnection.** Users with geographically diverse local-area networks can provide LAN-to-LAN interconnection with essentially the same response time as encountered locally.

■ **Medical image processing.** SMDS enables timely transfer of medical images, such as those produced by X-ray, computerized tomography, magnetic resonance and ultrasound. This will significantly speed up doctors' ability to diagnose medical problems. Conventional data communications systems can take four minutes on a 9.6K bit/sec line or 30 minutes over 1,200 bit/sec facilities to send a 512- by 512-pixel image. Under SMDS, this transfer would occur in a fraction of a second.

■ **Earth resources mapping.** As with medical imagery, SMDS allows the transport of high-resolution graphical representations of the earth, transmitted from satellites to scientists around the nation. Computer analyses of this data led scientists to uncover widespread agricultural disease and monitor irrigation effectiveness. Without SMDS, scientists have had to rely on optical disk-based media sent via standard express mail.

■ **Host-to-host channel extension.** Host-to-host communications may be routed over the public network instead of over private facilities. This setup potentially decreases the overall costs as well as increases the reliability of the overall system due to the innate redundant characteristics of the public metropolitan-area network.

— Daniel Briere

AT&T ACCUNET® T1.5.
It's as close as you can get to risk-free.

When it comes to T1.5, a lot of people take it for granted that a pipe is a pipe is a pipe. But the fact is that no other provider offers a safety net like the one you get with AT&T's ACCUNET T1.5.

Just how much more reliable is ACCUNET T1.5? Our monitoring and maintenance are so advanced, we actually set the standards for high performance in the industry.

And if there is a problem with one of our lines, we give you more ways to get your traffic out of harm's way. With over 60,000 digital miles and more than 450 points of presence, our routing diversity capability far surpasses that of our competition.

With ACCUNET T1.5, you can also get built-in, end-to-end protection features* that automatically switch your traffic to a backup channel in the event that one of your lines degrades.

We have so much confidence in the reliability and performance of ACCUNET T1.5 that we're willing to offer it with a guarantee. And that's something else you can't get anywhere else.

So look before you leap into T1.5. You could save your company a lot of downtime.

Reliability.
Another AT&T advantage.

For more information about ACCUNET T1.5 and ACCUNET network management products, call your AT&T Account Executive or 1 800 247-1212, Ext. 149.

AT&T
The right choice.

©1990 AT&T

*Network Protection Capability option not available in all locations.

ACCESS SERVER

Freedom of Choice...

A New Family of Terminal Servers from Gandalf!!

Gandalf's new Access Server family of terminal servers offers unparalleled flexibility by providing connectivity in multi-protocol environments.

LAT™ Terminal Server

- Local and remote terminal access to DEC Ethernet-based resources; LAT licensed software
- Simultaneous TCP/IP, X.25 or non-Ethernet host access available

TCP/IP Terminal Server

- Access TCP/IP hosts over an Ethernet network
- Utilize as an X.25/TCP/IP gateway

Wide Area Terminal Server

- Functions as a large statistical switching multiplexer or X.25 PAD
- Connects remote users via statistical multiplexing or X.25 to TCP/IP or LAT

For more information, call 1-800-GANDALF ext. 200

Circle Reader Service No. 1

gandalf

CABINETS

CABINETS

Price starts from $695.00.

Immediate delivery!

All sizes and colors!

New LAN Server Cabinet Available.

CODARAM corporation

AT&T Paradyne Authorized Distributor

4040 Nine/McFarland Road, Suite 800 • Alpharetta, Georgia 30201
(404) 664-3510 • (404) 664-3610 (FAX) • (800) 726-0278

Circle Reader Service No. 2

CSU

Upgrading to ESF on your T-1 circuits?

We'll give you $500 for your old CSUs

If you upgrade your existing CSUs to Verilink Intelligent ESF CSUs by December 31, 1990, your existing CSUs, regardless of manufacturer, are worth up to $500 credit against your purchase. Call now for more information and take advantage of the network management benefits of ESF today. When you call, we'll send you "The Book on ESF" as a free gift.

1-800-669-4278

VERILINK®

Circle Reader Service No. 3

The Helfrich Company 19782 MacArthur Boulevard Suite 310, Irvine, California 92715

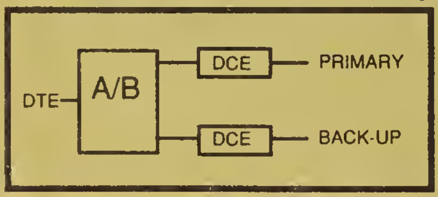
56K BACK-UP

Fully Automatic Back-up for Your Digital Circuits.

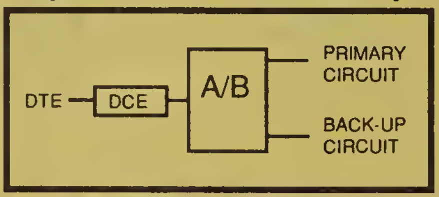
Back-up Any Of These:	With Any of These:
DDS; 2.4K to 56K	Switched 56
T1, Fractional T1	Dial-up Modem (V.32)
Any/All DS0 Channels	Redundant Circuits

Dataprobe offers complete back-up solutions for digital circuits. These Systems feature detection of failed circuit, auto-switching to back-up and restoration to the primary circuit when restored. Two types of back-up are available:

Alternate Route Back-up



Spare Circuit Back-up



Send for detailed catalog and applications bulletins.

dataprobe INC.

170 Coolidge Avenue Englewood, NJ 07631
Phone (201) 569-6464 Fax (201) 894-0939

Circle Reader Service No. 21

DATACOMM MATRIX SWITCH

BLOCKED BY OLDER MATRIX SWITCH TECHNOLOGY?

Discover the *NEW DIMENSIONS* in Network Management Technology
With the *MTRX* Family of *TANDEM* Electronic Matrix Switches

MTRX-500	512 Ports
MTRX-4000	4096 Ports
MTRX-8000	8192 Ports

BENEFITS	MTRX	OTHERS
*Largest Non-Blocked Port Capacity...8192 PORTS	YES	NO
*Up To 98% Data Cable Reduction DTE to DCE	YES	NO
*4000 FT DTE TO DCE With Twisted Pair Cable	YES	NO
*LAN Based PC Control - Ethernet Or Token-Ring	YES	NO
*Multi-tasking (VM-386) Universal Workstation	YES	NO
*Integral BERG/BERT and S.A.M. Test Functions	YES	NO
*Non-Proprietary Database, dBASE III PLUS/IV	YES	NO
*Supports Data Rates To 2.048MBPS	YES	SOME

Over 30,000 Ports Installed At RBOCs and Fortune 1000 Companies

Datacomm Management Sciences Inc.

"The Responsive Ones"

Circle Reader Service No. 4

25 Van Zant Street
East Norwalk, CT 06855
TEL: (203) 838-7183

dBASE III PLUS/IV are trademarks of Ashton-Tate Corporation

DATA COMMUNICATIONS

FREE

MICOM® DATA/VOICE NETWORKING SOLUTIONS GUIDE

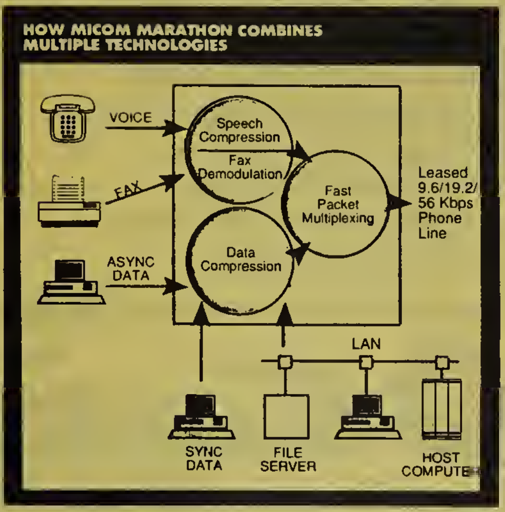
Call Today!

Potomac Digital, Inc. is a Full Service Distributor and Integrator of Networks, with an Extensive Inventory of Micom Communications Products

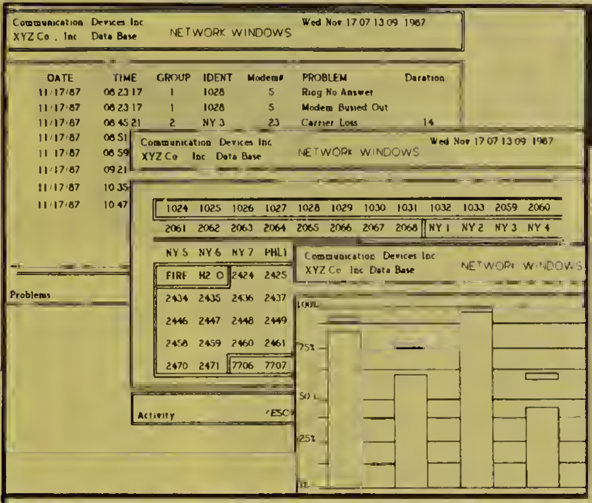
Potomac Digital, Inc.

301-840-0999

Circle Reader Service No. 22



DIAL UP MODEM MANAGEMENT



```
Communication  Devices Inc                         Wed Nov 17 07 13 09 1987
XYZ Co . Inc   Data Base      NETWORK WINDOWS

  DATE       TIME      GROUP  IDENT   Modem#   PROBLEM             Duration
11/17/87   06 23 17     1     1028      5      Ring No Answer
11/17/87   06 23 17     1     1028      5      Modem Bussed Out
11/17/87   06 45 21     2     NY 3     23      Carrier Loss           14
11/17/87   06 51
11 17/87   06 59
11/17/87   09 21
11/17/87   10 35
11/17/87   10 47

Problems

Communication  Devices Inc                         Wed Nov 17 07 13 09 1987
XYZ Co   Inc   Data Base      NETWORK WINDOWS

 1024  1025  1026  1027  1028  1029  1030  1031  1032  1033  2059  2060
 2061  2062  2063  2064  2065  2066  2067  2068 | NY 1  NY 2  NY 3  NY 4
 NY 5  NY 6  NY 7  PHL1
 FIRE  H2 O  2424  2425
 2434  2435  2436  2437
 2446  2447  2448  2449
 2458  2459  2460  2461
 2470  2471  7706  7707

Activity                                ESC

Communication  Devices Inc
XYZ Co  Inc  Data Base        NETWORK WINDOWS
```

DIAL UP MODEM MANAGEMENT

Any Vendors Modem
Any Speed
Any Type, Including V.32

Operating in 10 Countries
Field Proven since 1983

NETWORK WINDOWS (tm)
PC Based System

DAILY USAGE & ERROR REPORTS
AUTOMATIC BUSY OF "RING NO ANSWERS"
MODEM VENDOR INDEPENDENT

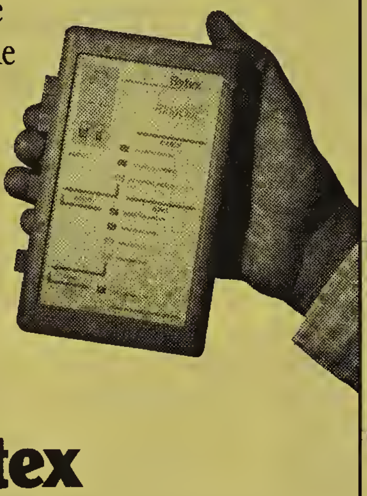
CDI

Call or write for information & DEMO Disk
Communication Devices Inc.
1 Forstmann Ct.
Clifton, NJ 07011
Phone (201) 772 6997 FAX (201) 772 0747

Circle Reader Service No. 23

DIAGNOSTIC TEST EQUIPMENT

Get your hands on the most comprehensive Token Ring cable tester for only $1495.



Introducing the Bytex RingOut cable tester—the first designed specifically for Token Ring. And the easiest-to-use. ▪ Tests 4 and 16 Mbps STP and UTP LANs. ▪ Detects damaged or improperly installed cables or connectors. ▪ Confirms correct operation of MSAU. ▪ Detects and isolates beaconing nodes. ▪ Works on live LANs—no shutdown required. *Order by January 1, 1991 for a 30-day money back guarantee.*

Call 1-800-23-BYTEX for details now.

Bytex

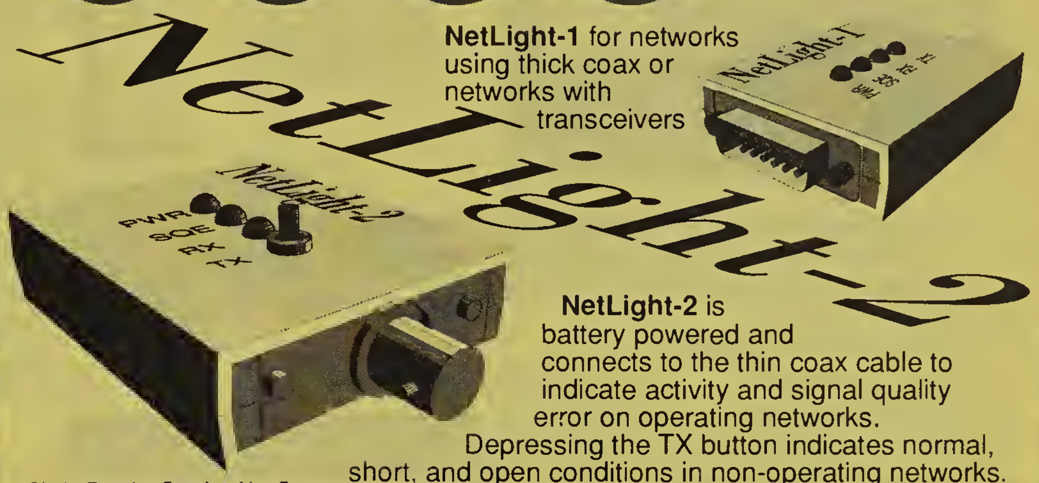
Bytex is a registered trademark of Bytex Corp.

Circle Reader Service No. 19

ETHERNET LINE MONITOR

NetLight-2

ETHERNET™ Testing Through Thick and Thin



NetLight-1 for networks using thick coax or networks with transceivers

NetLight-2 is battery powered and connects to the thin coax cable to indicate activity and signal quality error on operating networks.

Depressing the TX button indicates normal, short, and open conditions in non-operating networks.

Circle Reader Service No. 5

For Additional Information or to order your Netlight please call 1-800-525-2141 or contact:

Knowledge Implementations, Inc.

32 Conklin Road, Warwick, New York, 10990 (914)986-3492 FAX (914)986-6441

Dealer and OEM Inquiries Welcome
Quantity Discounts Available
Visa and MasterCard Accepted
In Stock for Immediate Delivery

Send For Free Info

NW Nov 90

For more information on any of the products and services advertised in *NetworkWorld's ActionCenter*, circle the Reader Service Numbers on this coupon which correspond to the advertisement of interest to you.

Complete the coupon information and mail to:
NetworkWorld
P.O. Box 5090, Pittsfield, MA 01203

Expires 2/28/91

Name ____________________
Title ____________________
Company ____________________
Phone ( ) ____________________
Street ____________________
City ____________________
State ____________ Zip ____________

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57

NW Nov 90

ETHERNET NETWORK MONITORING SYSTEM

The Network Professor®

- **Multi-Segment** Ethernet/IEEE 802.3 LAN Monitoring System.
- Global Network Monitoring and from **ANY** Location.
- Monitors **ALL** LAN traffic conditions on every segment, for all Stations/Nodes and Protocols, **simultaneously**.
- Alarming for user defined thresholds and detection of error conditions, resulting in **decreased downtime costs**.
- **X-Motif or ANSI** user interface provides access to current and historical network statistics via a Relational Database.
- Complies with **ISO Standards** for Enterprise Management.
- Industry proven since 1989. (**CALL NOW** for Fortune 500 references.)

"...only fully functional LAN Monitoring System..."
Bill Hancock

For Literature and your **FREE** Evaluation Package
CALL (213) 379-2505
*Look for our NEW **4 port Local Bridge!***

TECHNICALLY ELITE CONCEPTS®

Circle Reader Service No. 24

FRACTIONAL T1

FRACTIONAL T1 CSU/DSU

- * Compatible with carrier-provided T1 services
- * Inputs in multiples of 56 or 64 Kbps
- * Full management & control capability
- * Two models: Basic and Advanced

From the growing Rad family.

RAD
data communications inc.

151 W. Passaic St.
Rochelle Park, N.J. 07662
TEL: (201) 587-8822
FAX: (201) 587-8847

See Us At Comdex
Sands Expo Center
Booth # N3193

Circle Reader Service No. 20

MODEM

For diagnostic leased line modems and DSU/CSU's - DEPEND ON IBM!

786X MODEM FAMILY

Diagnostic leased line modems built with IBM dependability:

- Point-to-point or multi-point
- Standalone or rackmount
- Integrated Dial Backup
- Integrated Fan-Out/Multiplex
- Full Netview support

CENTRON DELIVERS!

As an Authorized IBM Modem Distributor, Centron DPL offers:

- Large available inventory
- Flexible financing
- Technical support
- Full IBM support, Qualifies for VPA and CFO credits

Call a distributor with a difference:

Centron DPL Company

Authorized IBM Modem Distributor Call: (800) 532-7532

IBM Business Partner
Authorized Distributor Program

Circle Reader Service No. 8

LAN AND WAN CONNECTIVITY

THE MOST COMPLETE T–1 ACCESS SOLUTION FOR AT WORKSTATIONS

ON BOARD CSU/DSU LETS YOUR WORKSTATION PLUG DIRECTLY INTO FRACTIONAL AND FULL T–1, PRI ISDN AND E1 (CEPT) SERVICES.

- SINGLE SLOT 16 BIT AT BUS
- HIGH PERFORMANCE LAPB PROTOCOL
- SELECTABLE X.25 PROTOCOL
- 12 Mhz COPROCESSOR WITH SHARED MEMORY
- MULTIPLEXING BUS FOR VOICE AND HIGH SPEED DATA
- FILE TRANSFER SOFTWARE INCLUDED
- SOFTWARE DEVELOPMENT SUPPORT FOR:
  Network Gateways, Bridges and Routers
  File Servers and Image Processors
- AUTO DIALING/ANSWER SOFTWARE FOR ISDN

PROMPTUS

A Workgroup Connectivity Company

207 High Point Ave., Portsmouth, RI 02871
Tel (401) 683•6100; Fax (401) 683•6105
1•800•777•LANS

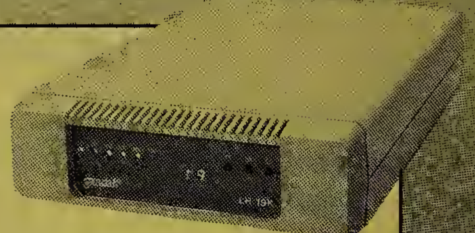
Circle Reader Service No. 6

MODEM

The Top End for Your Bottom Line

$ 2395

Gandalf Introduces the LH19K Modem!



At any distance, the LH19K Modem offers exceptional features and fast transmission (19.2 Kbps) backed by proven technology from Gandalf, a market leader in data communications products and information systems.

The LH19K will reduce your costs by decreasing the number of leased lines and the amount of transmission equipment needed by providing dual channel capability. Asynchronous and synchronous operation and controlled carrier support operation are also included in the many features of the LH19K Modem-- the best value available in the market!

Gandalf's responsive customer service and technical support provide additional value to our products and are committed to your network running with maximum efficiency. The LH19K Modem and Gandalf Data Inc.— the top end for your bottom line.

For more information or to have a salesperson contact you, call 1-800-GANDALF.

gandalf

Circle Reader Service No. [illegible]

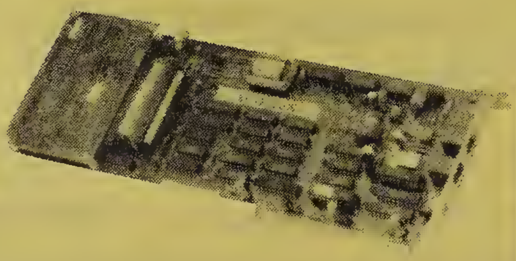
LAN/FAX GATEWAY SERVER

CAN LAN USERS FAX FROM WORKSTATIONS?

Yes, introducing Imavox's TurboFax-Net, our gateway server! Anyone on the network can send or receive faxes from their workstation. File transfer any text or graphics file at 9600 bps. Use your fax machine as a scanner. Postscript compatible. Supports various printers, scanners and fax machines. Short learning curve means increased productivity. Easy to use and install.

TURBOFAX-NET
LIST PRICE: $995
Credit Cards accepted

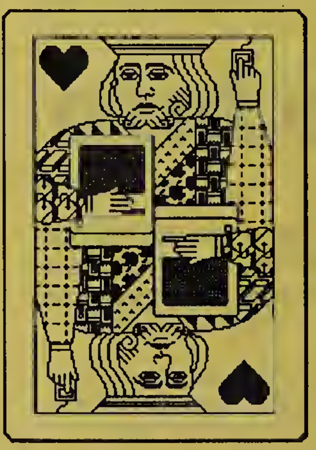
Also, for stand alone systems
TURBOFAX LIST PRICE: $395



Imavox

IMAVOX CORPORATION
3350 Scott Blvd., Building 38-02
Santa Clara, CA 95054
800-969-4628; FAX: 408-980-8718

Circle Reader Service No. 7



Network World **'s Direct Response Card Decks** can be your trump card for generating quality leads and boosting your sales. When you advertise in our decks, your message reaches audited buyers, for just pennies a contact. And with your advertising message on one side and your company name and address on the other, we make it easy for our readers - your customers - to respond to your message.
For information on issue dates, closings and rates, call:

Joan Bayon Pinsky
Sales Director/
Product Classified Advertising
1-800-622-1108
(or in MA 508-875-6400)

Clare O'Brien
Account Executive
1-800-622-1108
(or in MA 508-875-6400)
(Mountain and Pacific time zone advertisers)

Your marketing success is in the cards —
Network World's **Direct Response Cards.**

Send for free information

For more information on any of the products and services advertised in *Network World's* Action Center, circle the Reader Service Numbers on this card which correspond to the advertisements of interest to you.

Complete the coupon information and mail to: NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies

(Nov. Expires Feb. 28, 1991)

Name ____________________
Title ____________________
Company ____________________
Street ____________________
City ____________________
State __________ Zip __________
Phone ____________________

1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	
18	19	20	21	22	23	24	25	
26	27	28	29	30	31	32	33	
34	35	36	37	38	39	40	41	
42	43	44	45	46	47	48	49	
50	51	52	53	54	55	56	57	

Send for free information

For more information on any of the products and services advertised in *Network World's* Action Center, circle the Reader Service Numbers on this card which correspond to the advertisements of interest to you.

Complete the coupon information and mail to: NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies

(Nov. Expires Feb. 28, 1991)

Name ____________________
Title ____________________
Company ____________________
Street ____________________
City ____________________
State __________ Zip __________
Phone ____________________

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47 48 49
50 51 52 53 54 55 56 57

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 716 PITTSFIELD, MA

POSTAGE PAID BY ADDRESSEE

NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies

P.O. Box 5090
Pittsfield, MA 01203-9838

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 716 PITTSFIELD, MA

POSTAGE PAID BY ADDRESSEE

NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies

P.O. Box 5090
Pittsfield, MA 01203-9838

NETWORK MANAGEMENT

REMOTE LINE MONITORING, DIAGNOSTICS & SWITCHING

Spectron Networker provides:

- *Remote Line Access, Monitoring and Switching*
- *PC Interface with Color Graphics*
- *Integrated Remote Diagnostics*
- *Qualified Alarming*
- *Menu-driven Operation*
- *Context-sensitive HELP*
- *Graphic Lead State Display*

With **Spectron Networker,** you add centralized remote line monitoring, performance diagnostics, and switching to your manual tech control center. Inexpensively. And without replacing existing equipment.

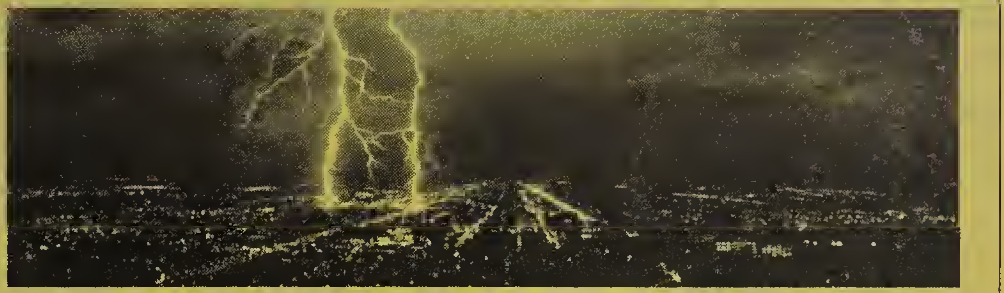
Circle Reader Service No. 25

TELENEX
CORPORATION
A UNIT OF GENERAL SIGNAL

Spectron Tech Control Products
13000 Midlantic Drive
Mount Laurel, NJ 08054
(609) 234-7900
FAX (609) 778-8700

NETWORK SECURITY & CONSULTING

Networks are Complicated and Dangerous



Finally a simple to use, yet comprehensive network security monitoring product. Not knowing what's happening on your network is very dangerous.

Call or FAX us for information and a FREE TRIAL

- *General Statistics*
- *Potential Security Intrusions*
- *Connection Info*
- *New Protocols*

NETWORK - 1, Inc.
P.O. Box 8370
L.I.C., N.Y. 11101
(800) NETWRK1
(718) 932-7599 • FAX (718) 545-3754
Circle Reader Service No. 27

- *Session Information*
- *Auto-Audit Reports*
- *Customized Reporting*
- *Real-time Network Security Information*

The Network Security Monitor

NETWORK MANAGEMENT

NETWORK MANAGEMENT LESS THAN $3000, FOR THE SMALL USER

CDI
Communication Devices Inc.
1 Forstmann Ct.
Clifton, NJ 07011
800/359-8561
Fax 201/772-0747

Monitor, Control and Report On:
- Dial modems
- Leased line modems
- CSU's/DSU's
- Any RS-232 device
- Voice mail
- Fax machines

- Modem vendor independent
- Powerful reporting
- Busy-out of Ring-no-answer
- Low cost, simple to install
- Automatic hot spare swapout
- Easy, low cost expansion

Optimize system utilization, reduce modem line costs, prevent client loss.

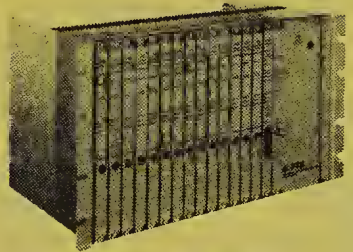
Call for a 30 day demo.

Circle Reader Service No. 26

NETWORK SYNC MONITOR

FTS / AUSTRON

Network Synchronization Monitor



- ***Helps eliminate data retransmision***
- ***Local or remote operation***

Enhance your service !

Closely monitor and control your clock performance *with this exciting new package from FTS/AUSTRON. Using Austron's 8800 Network Controller and the 3860 Telecommunication Synchronization Monitor from FTS, you can maintain the increased data demands and tighter standards needed to ensure the continuous precision network synchronization for error free data transfer in todays telecommunicaton networks.*

Call today for information:

WESTERN SALES OFFICE
AUSTRON, INC.
P.O. Box 14766
Austin, TX 78761-4766
(512) 251-2313

CENTRAL SALES OFFICE
AUSTRON, INC.
1930 Isaac Newton Sq. Suite 111
Reston, VA 22090
(703) 471-7963

EASTERN SALES OFFICE
FREQUENCY AND TIME SYSTEMS, INC.
34 Tozer Road
Beverly, MA 01915-5510
(508) 927-8220

- ***Cesium, Rubidium, GPS, or Loran Master Clock systems available for comparison***
- ***Detects clock rate degradation before it causes frame slips***

Circle Reader Service No. 18

NETWORK SCANNING & MONITORING

Cable Scanner

Pinpoint Network Cable Faults Fast!

The Scanner is a monitor, fault finder, cable locator and much more. Helps you pinpoint the location of shorts, opens or breaks. Its 32 character display reports the fault in plain English "short at 306 ft". With an oscilloscope, Scanner's high speed, pulse generating circuitry gives a detailed view of the entire LAN including transceiver, terminator and multiple faults.

* Cable length measurements
* Locate breaks, shorts, opens, bad crimps, etc.
* LAN activity monitoring
* Find cables in ceilings, walls, floors
* Cable TV troubleshooting
* Generate as-built drawings and specifications
* Isolate faulty network interface cards
* Very simple to operate

Included is Tracer for locating exactly where in the floor, ceiling, wall or patch panel the cable lies. Cable Scanner, Tracer and Operators' Manual are only $1495.

M-Test Equipment
P.O. Box 460006
San Francisco, CA 94146-0006

Call for Info

Outside CA: (800) 334-4293
Inside CA: (415) 861-2362
FAX: (415) 864-1076

Circle Reader Service No. 10

PC BASED PROTOCOL ANALYZER

A PC-based protocol analyzer that's serious about portability.

LMI is a registered trademark of Progressive Computing, Inc.

The LMI® is a PC-based protocol analyzer with a lot of get up and go. In a laptop, it weighs less than 15 pounds. You get maximum portability so you can zero in on problems in the shop or in the field. The remote option lets you monitor off-site lines, and captured data can be analyzed on any PC.

The LMI gives you in-depth plain English decodes, BERT/BLERT testing, time stamping, and interactive simulation.

We're serious about performance and portability. Call us at (708) 574-3399.

Progressive Computing

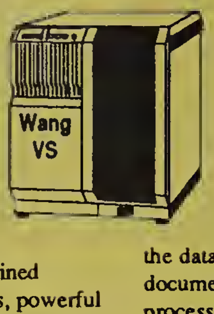
Progressive Computing, Inc.
814 Commerce Drive, Suite 101
Oak Brook, IL 60521 USA
(708) 574-3399 FAX (708) 574-3703
Circle Reader Service No. 11

PC LAN/WANG VS CONNECTIVITY

Wang VS Users:

Hitch It or Ditch It

PC Local Area Networks are here to stay, and changes are inevitable.



You could hitch your VS resources to PCs, LANs and Macintoshes by adding Lightspeed NVS. The results: regained control of PC resources, powerful applications made available to more people, and improved work group productivity. Plus no loss of investment.

Add Lightspeed MAIL Gateway, and you can even exchange mail between Wang Office and PCs.

However, if the decision has been made to ditch the VS, more changes lie ahead.

And Lightspeed NVS can help you with all of them.

You'll need to move all the data off the VS, convert documents to new word processing formats, and somehow run the primary VS procedures while you're in the process of migrating away. You'll want to run both systems parallel for awhile, too.

So, whatever you decide to do with your VS, call us.

MacSoft

Circle Reader Service No. 14

(805) 324-4291 ext. 51, 1800 19th Street, Bakersfield, CA 93301

WIRE CONNECTOR

Promises for Your Premises.

AT&T makes a myriad of connecting hardware for your premises, all of which are ideal for local area and voice/data networks, and available from Wise Components.

Among them is the UL-listed 110 Connector System, a miniature, quick-connect terminating method that simplifies line moves and rearrangements. It comes in two versions: cross-connect and patch panel.

The cross-connect system includes wiring blocks, connecting blocks and labels. And the patch panel system has terminal blocks, patch cords, patch cord adaptors and backboards.

Make the right choice for your premises. Call now for literature. And get the promises of Wise's superior service!

WISE COMPONENTS, INC.

28 Henry Street
Greenwich, Conn. 06830

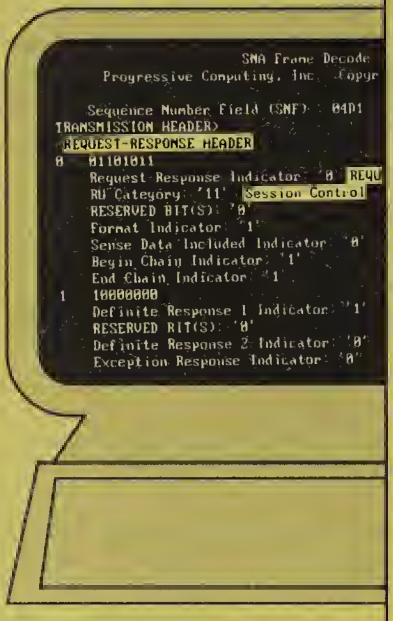
AT&T Authorized Distributor

800 543 4333 • In Conn. 800 852 8557 • Fax: 203 531 4859

Circle Reader Service No. 17

PROTOCOL ANALYZER

A PC-based protocol analyzer that speaks your language. Plain English!



```
                   SNA Frame Decode
     Progressive Computing, Inc.  Copyr

    Sequence Number Field (SNF) : 04D1
TRANSMISSION HEADER>
REQUEST-RESPONSE HEADER
0   01101011
     Request Response Indicator: '0' REQU
     RU Category: '11' Session Control
     RESERVED BIT(S): '0'
     Format Indicator: '1'
     Sense Data Included Indicator: '0'
     Begin Chain Indicator: '1'
     End Chain Indicator: '1'
1    10000000
     Definite Response 1 Indicator: '1'
     RESERVED BIT(S): '0'
     Definite Response 2 Indicator: '0'
     Exception Response Indicator: '0'
```

Now you can analyze data and zero in on errors more quickly. The LM1 Protocol Analyzer gives you easy-to-read decodes spelled out in plain English. It uses exact language from the standards for X.25, SNA, QLLC, and Q.931 protocols.

With the LM1, you don't miss a bit. It displays and explains every bit in a frame. It also highlights key details.

In-depth analysis in plain English. To see how the LM1 can expand your test equipment vocabulary, give us a call at (708) 574-3399.

Progressive Computing

Progressive Computing, Inc.
814 Commerce Drive, Suite 101
Oak Brook, IL 60521 USA
(708) 574-3399 FAX (708) 574-3703

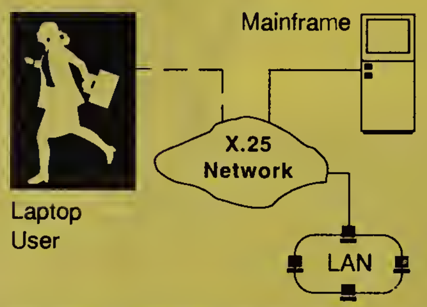
LM1 is a trademark of Progressive Computing, Inc.

Circle Reader Service No. 15

X.25 NETWORK CONNECTIVITY

DIAL X.25

EXPAND YOUR NETWORK TO USERS ON THE GO.



TIL's new XPERT/Office on the Go provides telephone X.25 connectivity from laptop PCs to mainframes and LANs. This full-featured half-card includes:

- ► Full CCITT X.25 compliance for data integrity
- ► Multiple emulations with most popular protocols
- ► Multiple sessions
- ► DES encryption
- ► File transfer
- ► Integrated network management

Call us today at 508-970-1189 for more information on our full line of X.25 network access products.

TIL SYSTEMS INC.

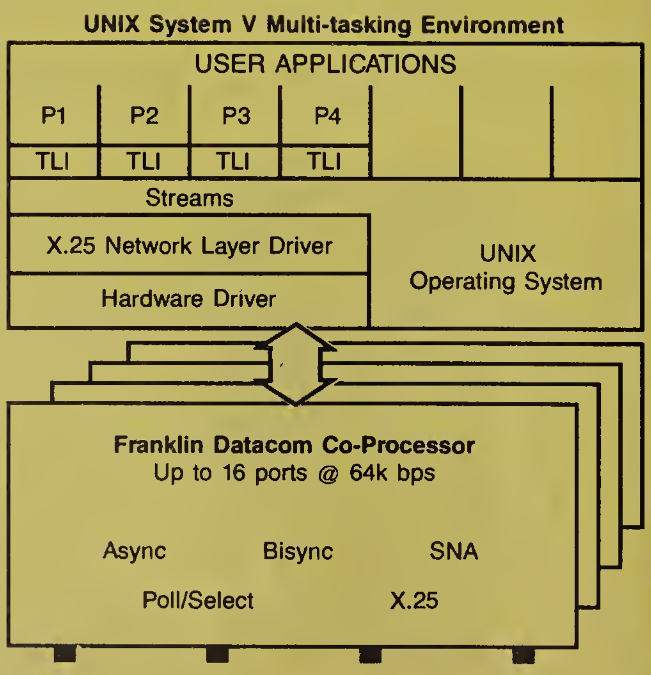
225 Stedman Street, Suite 27, Lowell MA 01851

Circle Reader Service No. 12

WIDE AREA NETWORKING FOR UNIX/AIX

UNIX WAN CONNECTIVITY

- * Multi-port Co-Processors for RS/6000, PC/386, PS/2.
- * Multi-Protocol Software includes AIX drivers, API; UNIX streams & TLI API.
- * Concurrent Protocols on *any* port may be: X.25, HDLC, SNA/SDLC or QLLC, Burroughs, UTS Bisync 3270/3780, Async.
- * X.25 Switch/PAD Option.



UNIX System V Multi-tasking Environment

USER APPLICATIONS

P1 P2 P3 P4

TLI TLI TLI TLI

Streams

X.25 Network Layer Driver

Hardware Driver

UNIX Operating System

Franklin Datacom Co-Processor
Up to 16 ports @ 64k bps

Async Bisync SNA

Poll/Select X.25

Franklin Datacom Inc.,
Tel: 805-373-8688

733 Lakefield Road,
Westlake Village, CA 91361.

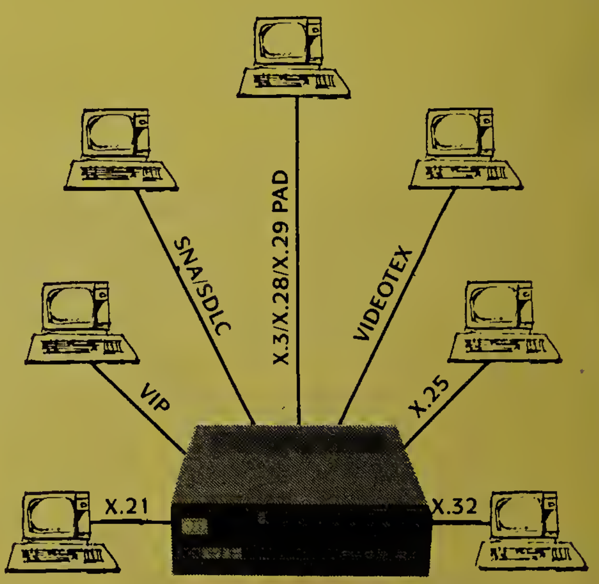
Circle Reader Service No. 16

X.25 NETWORK CONNECTIVITY

ONE UNIT. MULTIPLE CONNECTIONS.

OST, Inc. developed the PASS 25 to meet the demands of their end users by providing multiple connections in one unit. The PASS 25 is a multi-protocol X.25 switch that reduces network overhead costs by allowing systems that use different protocols to utilize the same transport network.

The PASS 25 supports multiple protocols including CCITT X.25, X.21, X.32, Videotex PAD, CCITT X.3, X.28 and X.29 PAD, VIP and SNA/SDLC. V.24/V.28, V.35, and V.11 physical line interfaces are available. The unit handles from 2 to 18 ports with the option of upgrading in 2 channel increments. To increase your networking options, call OST today!



OST

OST, Inc.
14225 Sullyfield Circle
Chantilly, Virginia 22021
(703) 817-0400

Circle Reader Service No. 13

NETWORKING MARKETPLACE

DATA COMMUNICATIONS

SPECIAL
NETWORK SYSTEMS CORP
** HYPERCHANNELS **
Model A-400 WITH CABINET

Preowned equipment priced from 70% OFF LIST while current supply lasts
Guaranteed eligible for NETWORK SYSTEMS MAINTENANCE.

We are a full line DIGITAL EQUIPMENT CORP (DEC) dealer.
Call us anytime you want to BUY or SELL anything DEC.

CARLSON COMPUTER INTERNATIONAL

MEMBERS
DIGITAL DEALERS ASSOCIATION

11956 Bernardo Plaza Dr.
Suite 503
San Diego, Ca. 92128
800-334-7073
FAX (619) 486 9083

P O Box 10037
Springfield
Missouri 65808
800-548-7073
FAX (417) 725 5722

MAKE THE RIGHT PASS

ARX.25 TM

X.25 PORTING SOFTWARE & PORTING SERVICES

- "C" Source modules
- HDLC/LAPB driver
- X.29, X.28/X.3 PAD
- Z85(C)30 Driver (DMA, PIO)
- Live PC implementations
- Porting & certification service

Call for other X.25 or source modules

ARC
Advanced Relay Communications
INCORPORATED

1420 E. 20th Ave.
Eugene, OR 97403
Tel (503) 345-9178
Fax (503) 484-0216

ADVANCED NETWORK COMMUNICATIONS, INC.

Save 50% and more
on pre-owned & unused
Data Communications Equipment

Featuring:
INFOTRON:

990/992 INX4200
790/792 INX4400
632/616 INX4600
380/480
INFOSTREAM 1500
RACAL * GDC * UDS * And more

Whole units and single boards

All cables, DB25, V.35, etc.

1 year warranty on all equip.

Sales and service 24hrs/7days

For more information contact
John Gillespie
Sales Dept. 609-931-6627

INFOTRON

EQUIPMENT
WHOLE UNITS/
SPARES

990, 790, 632, 616, 680
480, 380, IO NEST'S, ETC.
chassis, cabinets & more
MODULES
1000 boards in stock
all items 50% off or more!
if we don't have it,
we can find it.

M.A.R.C.
615-822-7990
FAX 615-822-7986

MAKE THE RIGHT PASS

XBRIDGE TM

NOVELL X.25
LAN-WAN CONNECTION

- Standard NetWare driver
- Connects up to 11 LANs
- Supports NCP filter mode
- T1 or fractional T1 speed
- RS-232, RS-449, V.35
- NetBios interface available

Call for other X.25 or source modules

ARC
Advanced Relay Communications
INCORPORATED

1420 E. 20th Ave.
Eugene, OR 97403
Tel (503) 345-9178
Fax (503) 484-0216

TRAINING

The Walsh Group

Technical
Video Programs
Produced by AT&T
Bell Laboratories

- * Switching Fundamentals
- * Electronic Switching
- * Signaling & Traffic
- * Electrical Communication
- * Transmission Fundamentals
- * Packet Switching

Demos available

Call for information
1-800-525-6579
(207) 846-1218

TeleCommunications Training Monthly

VIDEO TAPE
Training & Industry News
New subject every month
including:

- X.25 Protocol Analysis
- SDLC/SNA Protocol Analysis
- ISDN BRI "The Basics"
- Switched Telephone Circuit Basics
- T1-Carrier
- Network Topology
- Local Area Network Protocols
- DataCom Concepts (RS-232-C)
- Analog Line Measurements

Call for Demo Tape
(215) 598-3293

TELETUTOR®

COMPUTER-BASED TRAINING

LAN
X.25
T1

FOR FREE CATALOG
OF ALL OUR COURSES
CALL
1-800-542-2242
(603) 433-2242

SOFTWARE

Open Systems & UNIX

270 UNIX System Exhibitors
Biggest UNIX Event of the Year
FREE Workshops Daily
Complete Conference Program
REGISTER NOW!

Call: **800-323-5155**
for complete details
(708-299-3131 in Illinois & outside U.S.)

UniForum
The International Conference of UNIX® Systems Users

January 22 – 24, 1991
INFOMART Dallas, Texas

Reminder:

The Dec. 3rd Issue

Closes Nov. 21st

The following advertisers appear on the FAXNeT form on page #55:

Teletutor UniForum
Tel. Training Monthly

NETWORKING CAREERS

DIRECTOR OF NETWORK SYSTEMS

Syracuse University

The Computing & Network Services Department at Syracuse University is seeking applications for the newly created position of Director of Network Systems. The Network Systems organization is responsible for supporting campus-wide data communications networks including a high-speed fiber optic TCP/IP backbone, along with providing technical support for a UNIX timesharing system and multiple workstation clusters.

The Network Systems Director will report to the Executive Director of Computing and Network Services and will have management responsibility for a staff of thirteen professional/technical employees. The Director will be expected to provide leadership and vision with respect to enhancing networking capabilities at Syracuse University and supporting a multi-vendor distributed computing environment.

Qualificatifons:

- MS in Computer Science, Engineering or related field or equivalent combination of education and experience.
- 5 or more years' experience in supporting a complex heterogeneous network environment preferably at an academic institution.
- Comprehensive knowledge of various protocols including TCP/IP, and experience with local area networking of MS-DOS, Macintosh and UNIX workstations.
- Familiarity with evolving network standards such as OSI, FDDI and ISDN.
- Ability to articulate network strategies, manage projects, and integrate new technology into the university environment.
- Familiarity with a broad range of network services and network management systems.
- Excellent communication, interpersonal and participatory management skills.

We offer an excellent benefits package and salary commensurate with experience. Please submit your letter of application, including resume, by November 26, 1990, to:

SYRACUSE UNIVERSITY
Office of Human Resources
Skytop Office Building
Syracuse, NY 13244

As an equal opportunity, affirmative action employer, Syracuse University especially welcomes and encourages applications from women and minority candidates.

Need to Hire Quality Networking Professionals?

NETWORKING EMPLOYMENT SOLUTIONS delivers your detailed recruitment message directly to people with the qualifications YOU select, and pre-screens respondents with YOUR questions.

The result is qualified candidates who understand and meet your basic hiring criteria, at a FRACTION of what you usually spend on print advertising or recruiter's fees!

- Not a Recruitment Agency.
- Precision-targeted direct mail recruitment advertising plus candidate pre-screening, drawing on our exclusive current database of over 100,000 networking professionals nationwide.

Want to know how many candidates fit your specific hiring criteria? Call toll-free (800) 333-1666 and ask for an NES account executive. We'll do a preliminary search and show you the results at NO COST!

employment SOLUTIONS

A Cooperative Service of
Help Wanted On-Line and
Network World

NETWORKING RESOURCE DIRECTORY

Network World's Resource Directory is sold on a 26-week basis and is net priced for that period. A line listing is company name and telephone number. Display listings, copy of your choice, are available in four sizes.

Line Listing Rates

Company listing	$500.
2-9 additional listings	$450. per listing
10 or more additional listings	$400. per listing
Bold listing — extra	$ 50. per listing

Display Listing Rates

2 5/16″ wide x 1/2″ deep	$1,000.
2 5/16″ wide x 1″ deep	$2,000.
2 5/16″ wide x 1 1/2″ deep	$2,800.
2 5/16″ wide x 2″ deep	$3,600.

Space and copy closing for next updated issue is November 20. Listing begins in December 10 issue and runs through the June 10, 1991 issue.

For more information, or a complete list of headings, call Eleni Brisbois, at 1-800-622-1108 or fax 508-651-1853. Mailing address *Network World*, Eleni Brisbois/Resource Directory, 161 Worcester Road, Framingham, MA 01701-9172.

Computers/Peripherals

Facsimile Machines

GammaLink	**408-744-1430**

Memory Upgrades

MEMORY UPGRADES

IBM, COMPAQ, AST, DEC, EPSON, HP
NEC, SUN, TOSHIBA, ZENITH, Others

5 Year Warranty - Immediate Delivery!

Σ SIGMA DATA
New London, New Hampshire
Established 1980
CALL FOR OUR PRICE LIST

800 446-4525

Data Communications

Data Compression Equipment

RAD Data Communications Inc.	201-587-8822

Diagnostic Test Equipment

Analog Line Testers

Navtel Inc	**416-479-8090**
3M Dynatel Systems Division	**800-426-8688**

Cable/Interface Testers

Navtel Inc	**416-479-8090**

Centralized Network Management Systems

AR Division, Telenex Corp.	**800-368-3261**
Communication Devices, Inc.	800-359-8561
DIGILOG/CXR	**215-628-4530**

Error-Rate Measurement Equipment

Navtel Inc	**416-479-8090**
3M Dynatel Systems Division	**800-426-8688**

Optical Fiber Test Equipment

3M Photodyne Inc	**805-388-8378**

Performance-Measurement Equipment

Navtel Inc	**416-479-8090**
3M Dynatel Systems Division	**800-426-8688**
Tektronix/LP Com	**800-826-8675**

Protocol Analyzers

SNA 3270/LU6.2 Tests
- 3800+ Validation & Load Tests
- SDLC and Token-Ring • PC-Based
- Specs and Source Coding Provided

Applied Computer Technology
Garland, TX (214) 271-6550

TEST YOUR NETWORK WITH THE BEST

OUR PROTOCOL ANALYZERS
* Test Networks at Higher Speeds
* Are Easier to Use with EASY-VIEW™
* Are More Powerful and Flexible
* Test ISDN, T1, SS#7, SNA, X.25,...

AR DIVISION OF TELENEX
CALL 1-800-368-3261
(In Virginia 703-644-9190)
AR DIVISION OF TELENEX

Protocol Analyzers cont.

Azure Technologies	800-233-3800
DIGILOG/CXR	**215-628-4530**

IBM MAINFRAME EMULATION
SNA/3270 CERTIFICATION

- Over 500 preprogrammed QA tests to CERTIFY Controllers, Printers, Keyboards & Terminals
- LOAD & THROUGHPUT Testing
- NPSI/QLLC/X.25 Testing • PU2.1 Testing
- Token Ring Testing • LU6.2 Testing

GSOFT SYSTEMS, Inc.
7221 Mountaindale Rd., Frederick, MD 21701
301-898-7973

Hewlett-Packard Company	
Colorado Telecomm Div	**719-531-4414**
Navtel Inc	**416-479-8090**

Testing Experts
- Protocol/Performance Analysis
- BERT & Digital Link Testing
- Analog Impairments Testing
- Breakout Boxes for all interfaces

(800) 2-NAVTEL
FAX: 416/475-6524
Navtel
Better by design

Tektronix/LP Com	**800-826-8675**

Protocol Analyzer
- ■ Full Dual Port Operation
- ■ 40-Megabyte Hard Disk Drive
- ■ Capability to 256 Kbps

Call 1-800-826-8675 for full details
from
Tektronix®
COMMITTED TO EXCELLENCE
205 Ravendale Drive, Mountain View, CA 94043

Telenex Corporation	**800-222-0187**

Protocol/Interface Simulators

GSOFT Systems, Inc.	**301-898-7973**
Navtel Inc	**416-479-8090**

DSU/CSU

Anixter	**800-343-5142**
RAD Data Communications Inc.	201-587-8822

Front-End Processors

Simpact Associates, Inc	**619-565-1865**

Microwave

Motorola Microwave	**800-962-1826**
Racon, Inc.	800-426-5245

Use Network World's Resource Directory every week to buy or sell networking products and services.

Modems

Limited Distance/Line Drivers

RAD Data Communications Inc.	201-587-8822

High Speed (9.6kbps+)

Anixter	**800-343-5142**
Western Datacom Co. Inc.	800-262-3311

Fiber Optic

Canoga-Perkins Corp.	**818-718-6300**
RAD Data Communications Inc.	201-587-8822

Multiplexers

Fractional T-1

AYDIN CONTROLS

MULTIPLEXERS AND 4:1 TRANSCODERS

- Full and Fractional T1 Rates
- Toll Quality Voice / High Speed Data
- Handles 9.6 Kbps Modem and Group III FAX

Call 1-800-366-8889

414 Commerce Drive • Fort Washington, PA 19034-2602

COASTCOM	**415-825-7500**

Optical Fiber

Anixter	**800-343-5142**
Canoga-Perkins Corp.	**818-718-6300**
RAD Data Communications Inc.	201-587-8822

Statistical

RAD Data Communications Inc.	201-587-8822

Time Division

RAD Data Communications Inc.	201-587-8822

T-1

Anixter	**800-343-5142**
Canoga-Perkins Corp.	**818-718-6300**
RAD Data Communications Inc.	201-587-8822

Network Management Systems

AR Division, Telenex Corp.	**800-368-3261**
Communication Devices, Inc.	**800-359-8561**
Dynatech Communications	703-550-0011
Micro Technology	714-970-0300

Patching Equipment

AR Division, Telenex Corp.	**800-368-3261**
Telenex Corporation	**800-222-0187**
3M Private Network Products	**800-745-7459**
Thomas & Betts Corporation	**908-685-1600**

Switches

Data

Wise Components Inc.	800-543-4333

Matrix

Datacomm Mgmt Sciences	203-838-7183
Dynatech Communications	703-550-0011
Telenex Corporation	**800-222-0187**

Packet

Amnet, Inc.	508-879-6306
OST, Inc.	**703-817-0400**

Port Selectors

RAD Data Communications Inc.	201-587-8822

Systems Integrators

GLASGAL COMMUNICATIONS, INC.
We wrote the book on systems integration!

Providing **ALL** your network needs through optimized design, installation, integration and maintenance of products and services from over 130 top LAN and WAN manufacturers.

Worldwide Headquarters (201) 768 8082

Systems Integrators cont.

PDI
Potomac Digital, Inc.
(301) 840-0999
FAX: (301) 417-0593

POTOMAC DIGITAL, INC. is a full service distributor and integrator of Networks, with an extensive inventory of WAN/LAN Products from:

AT&T PARADYNE
MICOM COMMUNICATIONS
NEC AMERICA, INC.
WELLFLEET
LANTRONIX
FIBER OPTIC PRODUCTS

StonyBrook Technologies, Inc.	**516-567-6060**

Terminal Emulation Boards

Avatar Corporation	800-282-3270

Terminal Servers

Datability Software Systems	**800-DIALDSS**

VISTA
Terminal Server

(1-800 DIAL-DSS;
in N.Y., 212-807-7800)

* 8 to an Unprecedented 128 Ports
* TCP/IP and LAT Compatible
* 8 Hayes-Compatible *Internal* Modems
* Full Function X.25 PAD

Local Area Networks

Bridges

Anixter	**800-343-5142**
CrossComm	**508-481-4060**
EICON TECHNOLOGY CORP.	514-631-2592
Interlink Computer Sciences	415-657-9800

Netronix.

The Second Generation Of Ethernet and Token Ring Bridges. 1-800-282-2535

Netronix
Technology That Works.™

RAD Data Communications Inc.	201-587-8822

LAN/WAN Bridges

Advanced Relay Comm., Inc.	503-345-9178

Brouters

RAD Data Communications Inc.	201-587-8822

Gateways

EICON TECHNOLOGY CORP.	514-631-2592
Interlink Computer Sciences	415-657-9800
Simpact Associates, Inc.	619-565-1865
StonyBrook Technologies, Inc.	**516-567-6060**

Installation Services

Coluccio Associates Inc	**212-908-5421**
GE Network Service	**800-726-4327**
Solunet Inc.	800-828-0151

Local Area Networks

Broadband Based

Anixter	**800-343-5142**

Ethernet Compatible

Anixter	**800-343-5142**

ANIXTER®
Wiring Systems Specialists
Voice • Video • Data • Power

digital™
Authorized Distributor
800-343-5142

DuPont-Electro-Optic Products	**800-888-LAN1**
Wise Components, Inc.	800-543-4333

NETWORKING RESOURCE DIRECTORY

Fiber Optic Based
Anixter..800-343-5142

10BaseT Systems
DuPont-Electro-Optic Products 800-888-LAN1

Token Ring
Anixter..800-343-5142

Token Ring Compatible
DuPont-Electro-Optic Products 800-888-LAN1

LAN Services

ExpertWatch

A unique service that monitors
your LANs 24 hrs a day, 7 days a
week so that you don't have to.

CrossComm Corp. (508) 481-4060

LAN/Mind, Inc. 800-325-5267

LAN Test/Management Devices

DIGILOG/CXR 215-628-4530
Hewlett-Packard Company
Colorado Telecomm Div............719-531-4414
Tektronix/LP Com....................... 800-826-8675

Routers

Anixter..800-343-5142
Interlink Computer Sciences 415-657-9800

Security

Encryption/Decryption Devices

GN Telematic, Inc. 508-667-8644

Software

Application Development Tool Kit

Proteo Software Inc..................... 800-668-6716

Cable Management

Network Facilities........................ 612-934-2655

Communications

Simpact Associates, Inc. 619-565-1865

FAXGate™
Facsimile Gateway for IBM Mainframes
FILEGate™
File Transfer Gateway for IBM Mainframes
Teubner & Assoc. 800-343-7070 405-624-2254

EMail/Messaging

Notework Corporation 617-734-4317

Facilities Management

CHI/COR Info. Management 312-454-9670
DIGILOG/CXR 215-628-4530
Telco Research Corporation 800-4T-ELCO
XTEND COMMUNICATIONS 212-725-2000

Micro-to-Mainframe

EICON TECHNOLOGY CORP.... 514-631-2592
StonyBrook Technologies, Inc..516-567-6060

Network Management

Communication Devices, Inc....... 800-359-8561
CrossComm 508-481-4060
DIGILOG/CXR 215-628-4530

Storage Devices & Media

Computer Room Equipment

Controller Stacking Frames
Data Connections, Inc..............919-668-1077

Structured Wiring Systems

Baluns

Anixter..800-343-5142
RAD Data Communications Inc. . 201-587-8822
The Siemon Company 203-274-2523
Thomas & Betts Corporation....908-685-1600

Baluns cont.

TRANSITION
ENGINEERING, INC.

The most complete selection of UTP
and STP Baluns shipped from stock.
3270 • AS/400-3X • Arcnet • Ethernet

Type 3 Media Filters • Panels • Testers
Active Hubs • Passive Hubs • Adapters

(800) 325-2725 (612) 941-7600

Made in USA
= *Higher Quality + Better Service + Wider Selection*

Wise Components, Inc. 800-543-4333

Cables

Coax
Anixter..800-343-5142
Wise Components, Inc. 800-543-4333

Fiber Optic
Anixter..800-343-5142

CHROMATIC
TECHNOLOGIES, INC.
31 Hayward Street, Franklin, MA 02038
508/520-1200 * FAX 508/520-0698
The most valuable fiber optic cable.

Siecor Corporation...................... 704-327-5189
3M Private Network Products ...800-745-7459
Wise Components, Inc. 800-543-4333

Twisted Pair
Anixter..800-343-5142
Wise Components, Inc. 800-543-4333

Connectors

Anixter..800-343-5142
3M Private Network Products ...800-745-7459
Thomas & Betts Corporation....908-685-1600
Wise Components, Inc. 800-543-4333

MOD-TAP®
Total Wiring Solutions
from
YANKEE
1-800-365-9720 FAX: 603-625-4915

Cross Connect Blocks

Anixter..800-343-5142
3M Private Network Products ...800-745-7459
The Siemon Company 203-274-2523

Wiring Concentrators

Anixter..800-343-5142

Support Equipment

Power Distribution/ Equipment Protection

BATTERY BACK-UP for NETWORKS
BEST PRICES
1-800-433-2288 The PURSUIT Corp.

Secondary
The Siemon Company 203-274-2523

UPS
3M Private Network Products ...800-745-7459

Support Services

Consulting

Business Software Inc.
Specialists in multi-media network
documentation
• Setup • Maintenance
• Training • Network Planning
Call: (212) 753-5333

Consulting cont.

LAN/Mind, Inc.............................. 800-325-5267
Multi-Tech Communications......201-627-2518

PRISM TECHNOLOGY INC.
NetWare 386/286 Consulting
Client/Server Applications
Sales & Installation
NOVELL
AUTHORIZED RESELLER
(617) 241-0451

Telco Research Corporation 800-4T-ELCO
XTEND COMMUNICATIONS....... 212-725-2000

Educational Training Services

Data Communications
Business Communications Rev.708-986-1432
ICA... 800-422-4636

E-Mail Training
Westcon Training Centers.........800-873-6040

IBM: SAA/SNA
Galaxy Consultants..................... 408-354-2997

LAN
Business Communications Rev.708-986-1432
ICA... 800-422-4636
Westcon Training Centers.........800-873-6040

Novell
LAN/Mind, Inc. 800-325-5267
PTXI..800-783-PTXI
Westcon Training Centers.........800-873-6040

Telecommunications
Business Communications Rev.708-986-1432
ICA... 800-422-4636

3COM
PTXI..800-783-PTXI

Installation Services

GE Network Service 800-726-4327

Novell Sales and Service
Installation - cabling - maintenance
Novell Authorized Training
CNE Training
Network Systems & Services
160 5th Ave. NYC - 212/691-2680

PCC
Pacific Coast Cabling, Inc.
Installation Specialists
Communications Cabling & Equipment
Data, Voice & Video Prewire Services
LANS WANS
Serving Southern California Since 1985
21610 Lassen St., Chatsworth, CA 91311
(818) 407-1911 Lic# 486194

Solunet, Inc. 800-828-0151

Lease/Resale Organization

SOURCE Telecommunications..214-450-2700

VSAT Installations

DOWNL INC.
NATIONAL VSAT INSTALLATIONS GROUP
1777 SOUTH BELLAIRE STREET • DENVER, CO 80222
(303) 756-0031 FAX (303) 756-9011

Telecommunications/ Voice

Call Accounting

DIGILOG/CXR 215-628-4530

Call Accounting cont.

Telco Research Corporation 800-4T-ELCO
XTEND COMMUNICATIONS.......212-725-2000

Key Systems

SOURCE Telecommunications.... 214-450-2700

Fax Processing Systems

Biscom.. 800-477-2472

e^{π} FAX RELAY

The FR-100 FAX RELAY connects a Group III facsimile machine via a PBX extension to the data port of a multiplexer. The FR-100 puts fax transmission over your dedicated data network using only 9600 or 4800 bps.

(408) 973-9800
Entropic Speech, Inc.

The FAX Group..........................619-792-6400
GammaLink...............................408-744-1430

ISDN Products

Anixter..800-343-5142
Hewlett-Packard Company
Colorado Telecomm Div............719-531-4414

PBXs (under 200 lines)

SOURCE Telecommunications.... 214-450-2700

Microwave Transmitters/Receivers

Motorola Microwave.................800-962-1826
Racon, Inc. 800-426-5245

Voice Response

Syntellect Inc. 602-789-2800

VSAT Customer Premises Equipment

Scientific-Atlanta, Inc.
Private Networks Business 407-255-3000

Transmission Services

Dedicated Lease Line

Communications Transmission. 800-272-9CTI

Facsimile

GammaLink...............................408-744-1430

Microwave

FCC Licensed Digital Microwave
Carrier • Bypass • Alternate Access
• Disaster Recovery/Diversity
(212) 509-5115 LOCATE
17 Battery Place, Suite 1200, NY, NY 10004

Motorola Microwave.................800-962-1826
Racon, Inc.................................... 800-426-5245

Packet Switching

Dynatech Communications 703-550-0011
StonyBrook Technologies, Inc..516-567-6060

VSAT

CSA-VSAT Consultants 408-996-0585
GTE Spacenet Corporation 703-848-1000
Scientific-Atlanta, Inc.
Private Networks Business 407-255-3000

Wide Area Networks

Concentrators

Amnet, Inc. 508-879-6306

Network Switches

Amnet, Inc. 508-879-6306

First Looks

continued from page 37

to view multiple VTX data bases simultaneously.

VTXpress costs $399 and is available now.

White Pine Software, 94 Route 101A, P.O. Box 1108, Amherst, N.H. 03031; (603) 886-9050.

Kodiak Technology introduces Ethernet hub with built-in repeaters

Kodiak Technology recently unveiled its **Multi-Media Hub,** a multifunction Ethernet interface. The interface also comes with a built-in repeater and supports coaxial or unshielded twisted-pair wiring segments.

The Multi-Media Hub fits into a single slot on an IBM Personal Computer AT workstation, enabling existing coaxial local-area networks to link to 10BaseT networks.

As an Ethernet adapter, the Multi-Media Hub connects a personal computer to an Ethernet via coaxial cabling or telephone-type wiring.

As a repeater, the device regenerates the timing of data so LAN segments can be lengthened.

The Multi-Media Hub costs $699 and is available now.

Kodiak Technology, 1338 Ridder Park Drive, San Jose, Calif. 95131; (408) 441-6900.

GTE upgrades Skystar Service

continued from page 37

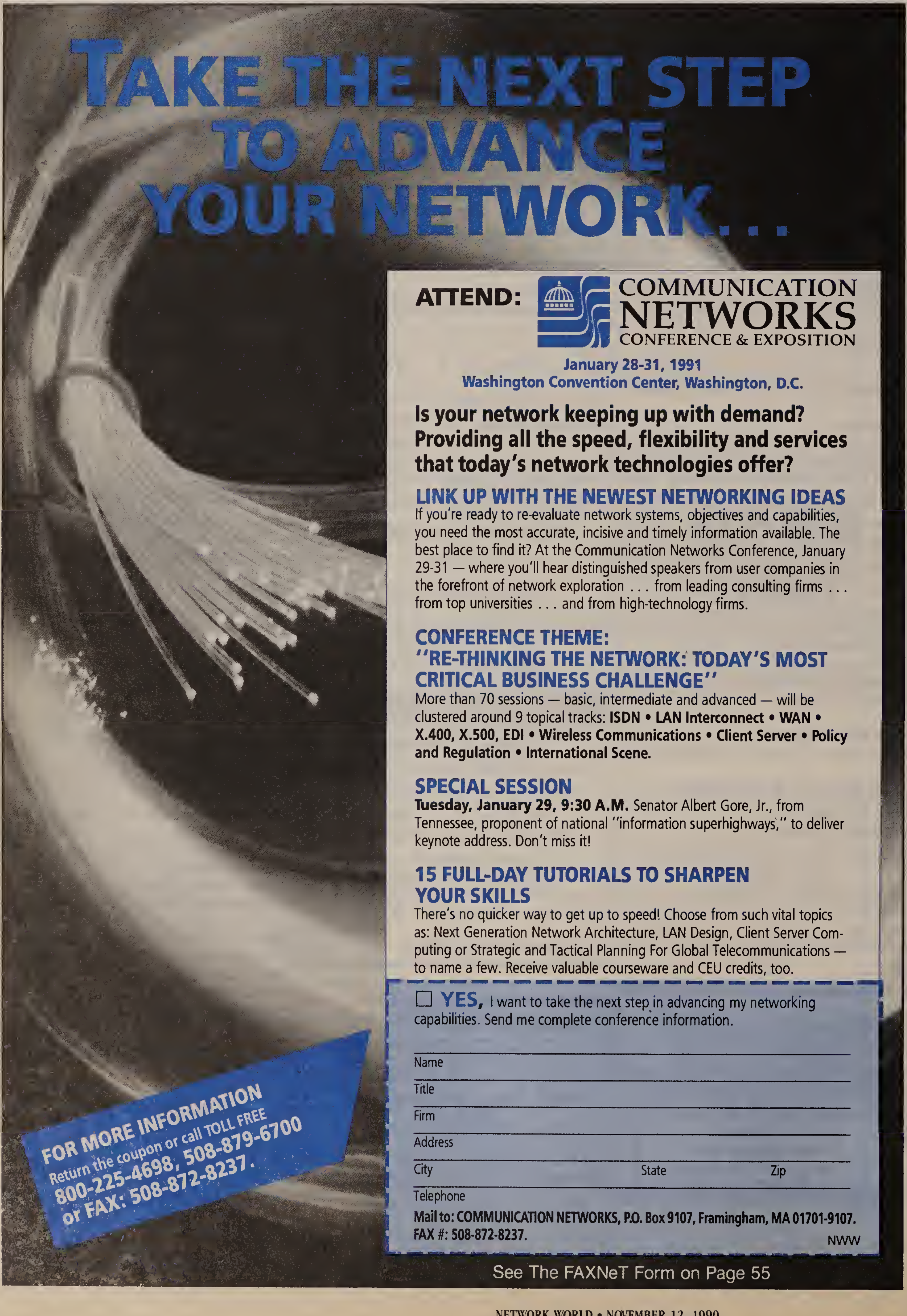
The packet switch examines data coming from the host to determine which VSAT is being addressed and forwards the data to the SAC supporting the VSAT.

In addition to being linked to the Ethernet supporting the Data Concentrators, each SAC is linked to a second Ethernet that supports a minicomputer dedicated to network management and several management consoles. As SACs receive management data from remote VSATs, they route it over the Ethernet to a Unix-based Arix Corp. minicomputer. Unix-based workstations attached to the same Ethernet can pull data from the minicomputer and display it in on-screen maps. This enables workstation users to monitor and control the VSAT network.

Currently, Skystar Network Service requires each SAC to pass network management data to a NEC Corp. Unix-based minicomputer via dedicated point-to-point links. Unix-based workstations attached to that minicomputer require users to respond to net management data via a command line interface, instead of the graphical interface offered on the new product.

GTE Spacenet plans to beta-test Skystar Plus in the first half of 1991 and roll it out in the third quarter of 1991. Pricing for Skystar Plus has not been set.

Users can write to GTE Spacenet at 1700 Old Meadow Road, McLean, Va. 22102, or call (703) 848-1000.


TAKE THE NEXT STEP TO ADVANCE YOUR NETWORK...

ATTEND: COMMUNICATION NETWORKS CONFERENCE & EXPOSITION

January 28-31, 1991
Washington Convention Center, Washington, D.C.

Is your network keeping up with demand? Providing all the speed, flexibility and services that today's network technologies offer?

LINK UP WITH THE NEWEST NETWORKING IDEAS
If you're ready to re-evaluate network systems, objectives and capabilities, you need the most accurate, incisive and timely information available. The best place to find it? At the Communication Networks Conference, January 29-31 — where you'll hear distinguished speakers from user companies in the forefront of network exploration . . . from leading consulting firms . . . from top universities . . . and from high-technology firms.

CONFERENCE THEME:
''RE-THINKING THE NETWORK: TODAY'S MOST CRITICAL BUSINESS CHALLENGE''
More than 70 sessions — basic, intermediate and advanced — will be clustered around 9 topical tracks: **ISDN • LAN Interconnect • WAN • X.400, X.500, EDI • Wireless Communications • Client Server • Policy and Regulation • International Scene.**

SPECIAL SESSION
Tuesday, January 29, 9:30 A.M. Senator Albert Gore, Jr., from Tennessee, proponent of national ''information superhighways,'' to deliver keynote address. Don't miss it!

15 FULL-DAY TUTORIALS TO SHARPEN YOUR SKILLS
There's no quicker way to get up to speed! Choose from such vital topics as: Next Generation Network Architecture, LAN Design, Client Server Computing or Strategic and Tactical Planning For Global Telecommunications — to name a few. Receive valuable courseware and CEU credits, too.

☐ YES, I want to take the next step in advancing my networking capabilities. Send me complete conference information.

Name
Title
Firm
Address
City State Zip
Telephone

Mail to: COMMUNICATION NETWORKS, P.O. Box 9107, Framingham, MA 01701-9107. FAX #: 508-872-8237.
NWW

FOR MORE INFORMATION
Return the coupon or call TOLL FREE 800-225-4698, 508-879-6700 or FAX: 508-872-8237.

See The FAXNeT Form on Page 55

Intergraph ushers in CAD conferencing era

continued from page 37

software running on the Intergraph workstation can establish a point-to-point connection with another workstation or dial into a synchronous multiport control unit that sets up the CAD conference with as many as eight users.

While CAD Conferencing Module enables users to view and edit files interactively, the product only supports the transmission of still-frame images and not full-motion graphics or video, which are often found in simulation files. In addition, users must also establish separate voice connections to the conference participants.

Once a conference is set up, users at any of the eight sites can manipulate the image or use a graphics stylus to mark the drawing so that other conference participants can view the changes.

Conference participants can zoom, pan or rotate graphics models depicted on the screen, and those changes will appear in real time on other participants' screens. CAD Conferencing Module users can also erase all or part of an image and then recover it, use an electronic pointer to highlight certain features or use color shading to highlight certain elements of the design.

All changes are viewed by users in real time, Tarver said, because only functional commands are passed across the network. When a conference is initiated, all participants receive a slide tray, which is a bulk file transfer of as many as 99 graphics images to be reviewed during the conference. This slide tray is then stored in each workstation's memory, and slides can be summoned on screen.

When a user zooms in on a particular element of the design, for instance, that command is echoed across the network to other workstations, which follow the same instruction.

While CAD Conferencing Module currently only works with Intergraph's workstations, DataBeam is planning to develop versions of the product for other CAD vendors' equipment. This would eventually enable users to set up CAD conferences among users with different CAD workstations.

CAD Conferencing Module is available now. It costs $35,995 for a system that includes a multiport control unit, telecommunications interface and stylus for a single workstation. Users can purchase additional interface and stylus packages for $10,995 each.

For more information, contact Intergraph, Huntsville, Ala. 35894-0001; (205) 730-2000.

Adaptive switch gets a mixed reception

continued from page 17

time of having to retrofit the switch when SONET-based services become available.

Andy Schopick, director of research affiliated with the investment firm Nutmeg Securities, Ltd. in Southport, Conn., agreed that Adaptive was right to base the STM on SONET because that technology is the switching architecture of the future.

But he cautioned, "At this particular time, it is nothing more than a product announcement. It's availability and market acceptance remains to be seen." Adaptive did not offer pricing or exact availability dates for the STM, although the company said it would ship the product in mid-1991.

The lack of pricing makes it difficult to compare the switch to other vendors' T-3 offerings that could be used for at least one of the same applications for which Adaptive has targeted the STM — as a concentrator node that aggregates voice, high-speed data, image and video traffic at a user's site and sends it over a T-3 link to access carrier-based services.

"Adaptive is right in thinking that there's a market there," LaRow said. "I hope that their product is priced correctly to be able to act as just an access manager as opposed to a networking switch."

Analysts said Adaptive appears to have placed a higher premium on redundancy than its competitors.

Along with the reliability features inherent in most T-3 switches, such as redundant power supplies and the ability to back up interface cards, the STM has dual switching modules that run simultaneously. That setup means no data is lost when a processor fails, as can happen with switches that rely on a hot backup processor.

"The processors have the capacity and the ability to take on the other's load if either one goes out," said Berge Ayvazian, vice-president of communications research at The Yankee Group, a consultancy in Boston. "That is the type of [on-line transaction processing] architecture that's required to ensure that the switch will not go down."

LaRow agreed. "They've taken a page out of Tandem [Computers, Inc.]'s choir book and have recreated it in their switch," he said.

Analysts were also impressed with how the STM, when outfitted with an Integrated Services Digital Network Primary Rate Interface card, could use the ISDN D channel to request switched T-1 or T-3 links.

"That's something that's dramatically new," LaRow said. "It's call setup like you see a central office switch doing, but [the STM's] doing it at the T-1 level."

> "It's going to be the Cadillac of the T-3 switching multiplexers that are available," said Mark LaRow.

▲▲▲

That capability will become more important as vendors of devices such as routers, bridges and private branch exchanges give their products the intelligence to signal for extra bandwidth when they near their peak capacity, he said.

But this is an example of a feature that other analysts said is ahead of its time and offers users no real advantage today.

Rosemary Cochran, a principal at Vertical Systems Group, a consultancy in Dedham, Mass., said the STM's support for SONET doesn't really help Adaptive because the service is not available yet and competing vendors such as Timeplex have already pledged to support it.

Nathan Muller, manager of consultant relations at General DataComm, Inc., said users can drive carriers to provide them with SONET today. Carriers are amenable to such agreements because the fiber is already in place in many areas and adding SONET-compliant network elements fits with their long-term plans.

General DataComm last week announced an agreement with Alcatel Network Systems for SONET equipment that will work with General DataComm's Megamux TMS T-1 multiplexers. ◘

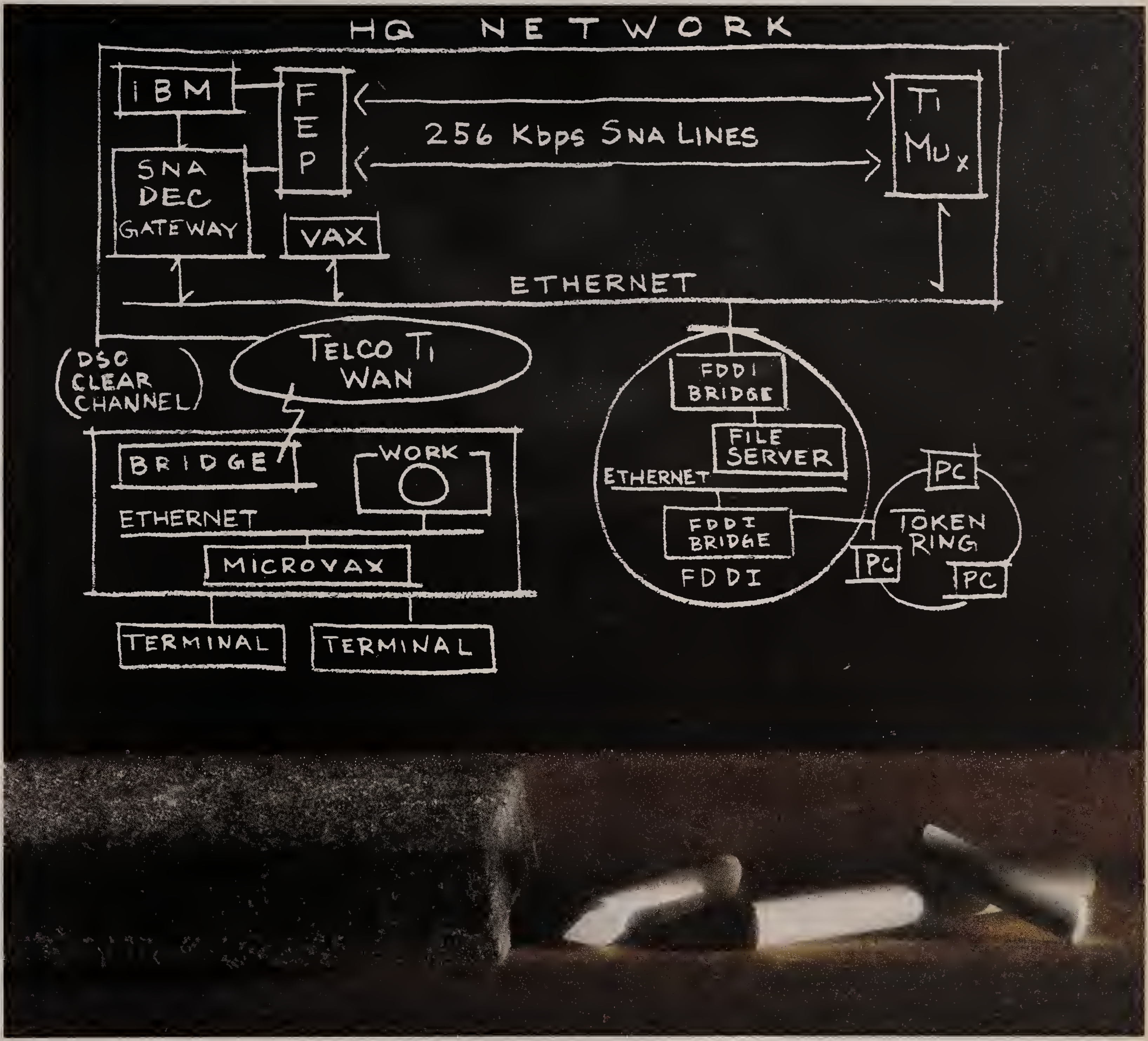
CCITT to accept modem standards

continued from page 17

14.4K bit/sec. Currently, Group III faxes are limited to a top speed of 9.6K bit/sec.

V.17 was developed at the request of CCITT Study Group VIII, which sets facsimile standards but cannot set modem standards. Study Group VIII will refer to the use of V.17 in its Group III fax standard.

Analysts said the higher speed standard is being developed in response to vendor desires rather than user demand. "To me, this is a case of the vendors being ahead of the users," said Larry Cynar, a senior analyst for Dataquest, Inc., a market research firm in San Jose, Calif. For instance, he said users are still moving from 1,200 bit/sec modems to ones operating at 2,400 bit/sec. Besides, Cynar said, there are few dial-up lines providing the quality needed to sustain transmission at 14.4K bit/sec. ◘



Communications is an art.

And it's an art that is getting more complex all the time, as gifted people attempt to make order out of all the diverse elements confronting us.

It's an art we've engaged in for more than a century, first in telecommunications and now in data communications and office systems. We integrate products from the leading component manufacturers in both areas. This gives you the best selection of the most advanced bridging, routing and integrated network management technology. . .as well as the assurance that you're getting equipment and service that you can rely on.

We take what you've got and add what you need to create the hybrid network that will best serve you. We integrate your infrastructure, PBX, mainframe, computing platforms, wiring distribution systems, LANS and WANS. GTE provides the consulting skills, design methodology, and design/integration capability with proven project management experience. Plus the services of a talented staff to furnish maintenance, service and training on site.

We provide the solutions which allow your people to do what they do best. . .run your business at maximum efficiency.

GTE

All trademarks referenced are the property of their respective owners.

FOR MORE INFORMATION CALL: 1-800-462-1075 NY STATE ONLY,
1-800-828-7280 OUTSIDE OF NY STATE.

THE POWER IS ON

See The FAXNeT Form on Page 55

MCI, British Telecom to deploy fast fiber

continued from page 4

Len Elfenbein, president of Little Falls, N.J., consultancy Lynx Technologies, Inc., said TAT-X will indeed be needed.

"It's clear that over the next few years, the volume of bandwidth needed between North America and Western Europe will increase by an order of magnitude as a result of new applications including imaging and videoconferencing," Elfenbein said. "If the unit cost for bandwidth in TAT-X continues its progression downward, that will increase demand and encourage the use of these new applications.

MCI and British Telecom are currently seeking partners to invest in TAT-X. "We have a healthy list of major international carriers that want to participate in this project," said Eidenberg, adding that the major Western European telecommunications authorities have expressed interest in the undertaking.

An AT&T spokesman said the company is considering joining the TAT-X consortium.

MCI and British Telecom have not yet committed specific dollar amounts to the project, he said, adding that investments will be determined when carrier participation is firmly established.

In addition to being the highest capacity transatlantic link, TAT-X will employ the most advanced network technology.

Like the Trans-Pacific Cable-5 (TPC-5) planned for 1996 by AT&T and Japanese carrier Kokusai Denshin Denwa, Ltd., TAT-X will utilize synchronous optical transmission equipment built around the Synchronous Optical Network (SONET) standard.

Current fiber cable systems rely on signal regeneration repeaters located on the ocean floor that are not considered capable of exceeding 1.8G bit/sec speeds.

But SONET's optical amplification methods could support terabit speeds simply by changing the switching hardware at both end points.

"SONET and multigigabit speed is desirable for the efficiencies," said Eidenberg, citing the greater throughput and lower transmission costs expected with TAT-X.

For the customer, TAT-X will provide very high-capacity information, Eidenberg said.

The TAT-X consortium will eventually select a construction company to build TAT-X. AT&T has said it would bid on the project, noting that it has just added a $6 million robotic seabed tractor to its inventory of undersea cable-laying equipment.

"We'll see how low their bid is," Eidenberg commented.

Eidenberg disputed reports that MCI is currently suffering from an acute shortage of international lines due to unexpected increases in traffic. He said the carrier is able to meet current requirements even though its share of the total U.S. outbound traffic to Europe has increased to 20%.

But Eidenberg acknowledged that MCI is eager to purchase international cable circuits allocated to AT&T during the establishment of older cable consortium arrangements. "AT&T ought to give up some of its circuits," he said.

An AT&T spokesman was noncommittal, saying the time to purchase capacity is when a consortium is being put together.

"We need TAT-X whether we get circuits from AT&T or not," Eidenberg said.

Ron Cybyske, senior vice-president for the Information Systems Group at Banc One Services Corp., said MCI last month briefed a number of MCI customers, including Banc One, on the project.

"If we look at a global economy," Cybyske said, "the ability to use MCI communications across the water is important." ◼

IBM joins FDDI LAN consortium

continued from page 6

operability among its products, saving customers from having to learn about FDDI interoperability through trial and error.

Sanjay Dhawan, the ANTC facility manager, said IBM's participation "is another sign that IBM is becoming more and more open." IBM will get to put the interoperability of its FDDI products and prototypes to the test early next year when ANTC runs its next group interoperability test, he added.

As a charter member, IBM joins the ANTC Technical Advisory Board, which is defining a standard test suite for FDDI products that will be tested at the ANTC facility.

IBM wanted to announce its induction into ANTC in June, when the company first announced its FDDI statement of direction, Baltz said. But it took longer than expected to work out a contract with ANTC.

In June, IBM announced plans to offer products to link hosts and workstations to FDDI nets, internetworking products that tie Ethernets and Token-Rings into FDDI networks and tools for managing FDDI nets, Baltz said. In September, the company announced FDDI support on its 3172 Model 2 host-to-LAN gateway.

Other ANTC program members responded positively to IBM joining the group.

"It's important to get an industry heavyweight like IBM in the group," said a spokesman for Synernetics, Inc., which unveiled an intelligent LAN multiplexer with FDDI support earlier this fall. "This should help us build user confidence."

Andy Verhalen, vice-president and general manager of 3Com Corp.'s Network Adapter Division, said IBM's induction into ANTC "should give the group increased credibility and could encourage more vendors to join." ◼

"That reminds me, now that we've managed to network everything, who's going to manage our network?"

Deciding on how to manage a network with different devices, systems and architectures can be an abstract proposition for any company.

Consider then, for a moment, this bold statement:

No other company helps companies design, set up and manage their multivendor networks better than IBM.

Surprised?

Then ponder this as well. IBM's NetView® family of network management software is unsurpassed in helping you better control, monitor and automate the flow of information in your company.

Graphically, all from one point. 24 hours a day.

Whether your equipment is IBM or not.

NetView manages OSI systems and handles your voice and data applications.

What's more, NetView has been

NetView is a registered trademark of International Business Machines Corporation. Copyright 1990 IBM Corporation.

ANSI takes new tack with standard

continued from page 6

But while the ANSI standard supports much the same functionality as LMI, with some enhancements, it uses different protocols and messages to do so, said Dan Grossman, principal engineer at Codex Corp. and a participant in T1S1.2. LMI was originally proposed by cisco Systems, Inc., Digital Equipment Corp., Northern Telecom, Inc. and StrataCom, Inc.

"As it happens, the protocol we came up with is not compatible with their documents," Grossman said. The differences amount to details regarding which connection the permanent virtual circuit status data should flow over and what bits and message formats should be employed to convey the information, he explained.

Ken Rehbehn, software developer at Netrix Corp. in Herndon, Va., and a member of the T1S1.2 subcommittee, said another important difference between the ANSI and LMI specifications is that the LMI status query function works in only one direction, from an end device such as a router to a net device such as a T-1 multiplexer.

That means the T-1 multiplexer has to rely on the router to send status updates. If it doesn't send them, the router could be perceived as inoperable even if it's not.

The ANSI specification defines a two-way flow of virtual circuit status data, meaning the T-1 multiplexers can poll routers and other end devices, Rehbehn said. ANSI's specification also works with switched virtual circuits, not just permanent ones, he added.

Charles Corbalis, director of data communications and systems architecture at StrataCom, said LMI is less CPU-intensive than the ANSI specification because it was designed to work only with permanent virtual circuits. More software is required to work with switched virtual circuits, he said, and the four LMI developers decided that support was not a requirement.

Corbalis added that this doesn't mean the two specifications are in conflict. He said StrataCom considered it good news that ANSI adopted the LMI functions.

The ANSI specification now goes out to vendors for another round of balloting and comments, but Silverman said the major issues have already been addressed.

AT&T offers new service control tool

continued from page 1

or dedicated link. The ABM controller instructs Digital Access and Cross-Connect Systems (DACS) throughout the AT&T network to perform changes in under three minutes.

"We're positioning ABM as the next step for CCR users," said Ralph Andreotta, product line manager for Accunet T1.5, T45 and network management at AT&T. Larger customers with more sophisticated network control needs use BMS, he said. "ABM will have improved feature functionality at a very comparable price. So we expect our CCR customers will want to migrate to it."

Jeffrey Held, a principal with Ernst & Young's Network Strategies, a Fairfax, Va., consultancy, agreed. "There's no reason to have two services of the same type. It'd be a very logical move for CCR users to migrate to ABM because the latter will be faster, easier to use and have more features."

With ABM, users could reconfigure existing T-1 links to support changing application needs. A company could, for example, instruct the controller to form a 384K bit/sec channel group from six 64K bit/sec channels to support a bulk file transfer. The same company could also instruct the ABM controller to form a full, unchannelized T-1 link to support a full-motion videoconferencing application.

ABM could be used to reconfigure channels within a 45M bit/sec link to support applications such as electronic vaulting, or the backing up of data at one site by sending the same data to a second site. It could also support computer-aided design and manufacturing and interconnection of geographically dispersed high-speed local-area networks.

Additionally, ABM gives users options for restoring channels and circuits.

Users can request that traffic from failed circuits be loaded onto predesignated backup circuits, sent over the public network or put on reserved circuits.

As an added attraction, AT&T said, it will provision new T-1 circuits to ABM users in one day. CCR users typically have to wait an average of 30 days for a new AT&T T-1 circuit, Andreotta said.

ABM also enables users to submit an online request to reserve additional bandwidth on a scheduled or as-needed basis. Bandwidth can be reserved at 56K bit/sec or in 64K bit/sec increments up to T-1, including intermediate rates of 128K, 256K and 512K bit/sec.

Accunet T45 Reserved

In addition, AT&T announced its Accunet T45 Reserved service for customers with higher bandwidth needs. Initially, users will order this service by dialing an AT&T operator, but later, they will be able to order it through ABM, Andreotta said.

This service is designed for users that transmit large amounts of bandwidth sporadically, for such applications as bulk data transfer, imaging and videoconferencing.

Users can select either point-to-point or point-to-multipoint T-3 links. AT&T can provide T-3 links from one main site to as many as eight satellite sites.

Accunet T45 Reserved service will be available in roughly 90 cities by mid-1991, AT&T said. The carrier pledged to add locations based on user demand for the service. AT&T declined to divulge pricing for the service.

enhanced, making it easier than ever to use, monitor problem alerts, and "talk" with IBM and non-IBM systems.

Of course, there are other attractive features of NetView to consider.

Like how it helps you better manage your company's voice and data information.

The way it cuts down network costs.

Or how it enables you to finally turn your network into the profitable corporate resource it was meant to be.

Which, all things considered, can paint a pretty picture for your company's future.

To find out how IBM can help you make the most of your network, call your IBM Marketing Representative.

IBM®

Users turn to nets to reduce travel

continued from page 2

travel and to use communications better at companies that haven't been so stringent," he said.

Meanwhile, videoconferencing firms are reporting an increase in calls from users interested in finding out about their offerings since the Middle East conflict sparked an increase in fuel and travel costs.

"The decision to do videoconferencing in a large company is probably not ever based solely on cutting travel costs," said Charles Whyte, product manager for videoconferencing and large business services for US West Communications, a subsidiary of US West, Inc. "But I can guarantee that the gas crisis will generate more interest in videoconferencing."

Among those companies trying to rein in business travel costs is McDonnell Douglas Aerospace Information Services Co. in St. Louis, said Cher Diller, senior telecommunications specialist for the McDonnell Douglas Corp. subsidiary.

When employees of the aerospace group recently received their paychecks, they were greeted with a message printed on the checks encouraging them to use videoconferencing to reduce travel expenses, Diller said. As a result, the videoconferencing room reservation center at the company was swamped with requests. "I thought it would be 1991 before I got that message printed on the paychecks, but the fuel crisis accelerated the process."

McDonnell Douglas Aerospace Information Services uses videoconferencing extensively, operating nine full-function videoconferencing rooms with equipment from Compression Labs, Inc. (CLI) and more than 30 offices equipped with PictureTel Corp. equipment, Diller said.

"Anybody at the company can use it and is encouraged to," she added.

A network executive at a large petroleum firm who requested anonymity said his department is feeling indirect pressure to help employees avoid unessential business trips. "But I expect to see a formal notice about making better use of the network soon given the latest round of airfare price hikes," he said.

Richard Miller, president of Rapport Communication, Inc., a Palo Alto, Calif., consulting firm specializing in messaging technology, said, "It's logical that more companies will take a harder look at messaging technologies as a way to stretch their travel budgets." According to Miller, the drastic oil increases in the 1970s inspired a number of large companies to consider and implement messaging systems to help offset rising travel costs.

A PictureTel spokesman said his company is still assessing the impact the impending recession and fuel crisis will have on his company. On one hand, the need to cut travel costs has generated interest in the company's offerings. But on the other hand, he said, a typical system for a large company could cost $50,000 or more at a time when companies are being more cautious about capital expenditures.

For that reason, more users may turn to videoconferencing services without purchasing equipment as an entry into the technology, said John Tyson, president and chief executive officer of CLI. "We haven't seen a dropoff in our business yet, which is positive when you look at how other businesses are doing," he said. "That might be attributable to the economic situation." ◼

University signs with MCI for fiber link

continued from page 2

The fiber net will save "20% right off the top" by replacing more than a dozen local telephone company T-1 lines currently used by the university to access MCI's Vnet service or other voice and data network services, said Steven Relyea, vice-chancellor of business affairs at UCSD.

"What this does is bring the MCI national network right onto our campus," Relyea said. "There is no longer a need for T-1 lines."

The university, which is simultaneously moving its campuswide network to fiber as part of a separate project, plans to have route diversity built into the net in case the primary link is knocked out of service, he added.

A major benefit of the network will be improved communications between the supercomputer center here and NSFNET, which also is undergoing a major upgrade, Relyea said.

The project is part of a T-1 to T-3 upgrade of the NFSNET.

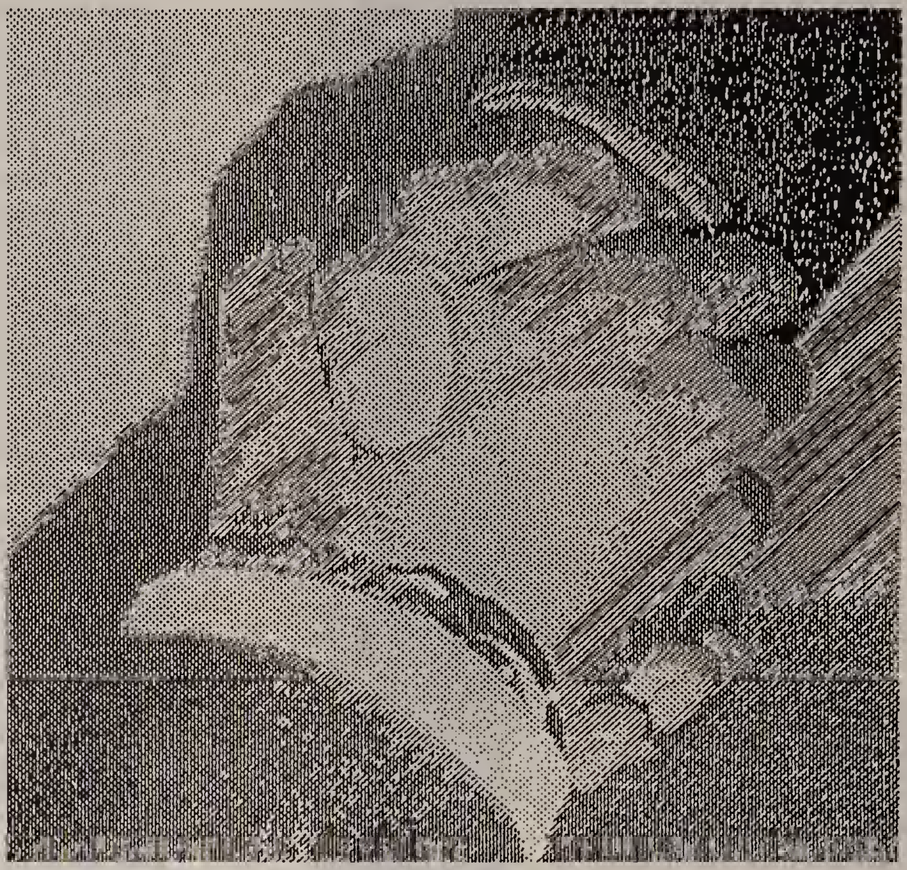
The fiber link will give thousands of researchers at more than 2,000 sites in the U.S. and overseas improved access to the supercomputer center in order to support such bandwidth-intensive applications as simulation of atmospheric and oceanographic conditions.

Over current T-1 lines, these types of applications chew up valuable supercomputer CPU time.

The new link will shorten the application processing time, making the two supercomputers at the center available to more researchers.

In addition, the fiber net gels with the supercomputer center's participation in the CASA network project. That project is one of five proposed networks being funded with $15.8 million from the NSF and the Defense Advanced Research Projects Agency.

The CASA project will connect the San Diego supercomputer facility with three other scientific centers through fiber supporting data communications speeds up to one gigabit. ◼



Partnerships for Success: Building Vendor Relationships

The 1991 ICA Winter Seminar
January 13-16,1991

Partnerships between users and vendors — a winning business strategy!
Your competitors are doing it...
Your friends are doing it...
Your clients are doing it...
Are you doing it?

ICA's powerful user/vendor seminar is the forum to:

- understand how partnerships will provide the competitive edge in the next decade
- discover the strategies of building and sustaining partnerships between users and vendors
- learn about legal, moral, and ethical issues of partnerships

See The FAXNeT Form on Page 55

Distinguished experts in communications partnering will include Dr. James C. Wetherbe, author of 12 books including *The Management of Information Systems,* publisher, educator, and leading consultant (co-sponsored by NETWORK WORLD).

Register now! Invite and encourage your vendor representatives to attend this vital seminar!

ICA Members: $595 Non-ICA Members: $695
Seminar location: Houston Westin Oaks Hotel
For registration information, call:

1-800-ICA-INFO (1-800-422-4636)

INTERNATIONAL
COMMUNICATIONS
ASSOCIATION

This seminar is brought to you by the International Communications Association, the largest and most broadly-based organization of professional telecommunications users in the world.

NCUG meeting portends CO-based ACD

continued from page 4

"The US West announcement is a major milestone in the evolution of ACD services," said James Yeip, an NCUG officer and telecommunications analyst for Federal Mogul Corp. in Southfield, Mich. "We'd like to see other RBHCs follow their lead as soon as possible."

The need for ACD service is being driven by Centrex users' expanding customer service and telemarketing efforts, which have resulted in rapid development and expansion of call centers.

Most Centrex customers now use carrier-offered uniform call distribution (UCD) services supported by older analog switches that cannot support ACD service.

UCD services pass incoming calls in hierarchical order, from the first agent to the last, regardless of whether agents are free to take the calls. Users cannot change the call distribution order. This makes UCD service less efficient than ACD services, which can pass incoming calls to the first available agent.

The NCUG's 1990 Customer Satisfaction Survey revealed that the average size of a Centrex customer's UCD center has more than doubled over the last year from 21 to 47 stations, while the average size of an ACD call center has increased from 60 to 96 stations.

"We use ACD service in virtually every department of our company," said Richard Jenifer, NCUG founder and telecommunications specialist with CNA Insurance Companies in Chicago. "They help improve the efficiency of our customer service and telemarketing efforts."

But, according to Federal Mogul's Yeip, "Right now, ACD service is extremely expensive and, therefore, only available to the largest Centrex customers."

The lack of generally available central office-based ACD services has forced many Centrex users to purchase premises-based ACD systems.

That's a bitter pill for users to swallow because many chose to use Centrex rather than buy switching equipment.

NCUG President Lowell Kessler, a supervising engineer with Detroit Edison, was forced to go that route when efforts to get Michigan Bell Telephone Co. to offer central office ACD service failed.

Kessler ended up buying a $2 million Rockwell Telecommunications, Inc. Galaxy ACD for its customer service center last year.

"We didn't want to go the ACD system route," Kessler recalled. "But we didn't have any choice; ACD was not available from our [central office] at that time."

Vendor troika teams in CO trial

continued from page 2

as much as a minute off the time it takes to look up data manually, said Elise Angiolillo, director of telecommunications for the university. Using the switch-to-computer link, operators will have almost instant access to a wealth of information, including the building and room location of the caller, as well as background medical information.

Components from all three vendors are required to allow Nynex's central office switches to communicate with the IBM AS/400. The Syracuse application will work with Nynex's central office-based automatic call distribution service. Nynex said it would consider tariffing the capability but it might not be offered until 1992.

The link also requires a software component introduced by Northern Telecom last week, dubbed CompuCALL, which resides on its SuperNode and DMS-100 switches. The software is based on the emerging Switch-to-Computer Applications Interface standard.

Additionally, the link requires software for the AS/400 that is based on IBM's CallPath Services Architecture, unveiled last May. Initially IBM announced support only for links between its computers and PBXs, not for the larger central office switches ("Big Blue's CallPath Services Architecture makes debut," *NW*, May 21).

In order to deliver voice and data simultaneously to an end user, the central office switch identifies an incoming number, which is communicated to the IBM computer over a designated line. In the trial, the line will be an Integrated Services Digital Network circuit, although it is possible to use a traditional 19.2K bit/sec line.

Files on the AS/400 are referenced by phone number and are sent to an operator's terminal with the voice call.

The trial will help IBM decide if and how it will offer the software as a product in the future, according to Frank Skidmore Jr., director of telcommunications network systems for IBM. During the trial, the call management software will be offered as part of the OS/400 operating system, but IBM may decide to offer it as an OS/400 upgrade or separately, he said. IBM also announced it may extend support across its computer line.

Analysts said last week that intelligent call management features are increasingly in demand by customers but until now, the focus has been on integrating PBXs with computers.

"This will assure Centrex customers that they don't fall hopelessly behind [PBX users]," said Peter Bernstein, a senior analyst with Probe Research, Inc. in Morristown, N.J.

Berge Ayvazian, an analyst with The Yankee Group in Boston, agreed that the announcement offers the potential for significant service improvement to Centrex customers. "[It] will allow Centrex customers to obtain access to the same applications that a PBX user would have," he said.

Ayvazian pointed out, however, that the regional Bell holding companies have shown differing degrees of enthusiasm for such enhancements to their Centrex services. Therefore, it's unclear to computer and switch manufacturers just how vigorously they should pursue the new technology, he said.

As an alternative, long-distance carriers could offer call management services from their switches nationwide. Ayvazian said Northern Telecom could modify its CompuCALL software to work on its larger DMS-250 switches used by long-distance carriers. US Sprint's network is based entirely on Northern Telecom switches, and MCI Communication Corp.'s net is based largely on Northern Telecom gear. Neither carrier could be reached for comment.

AT&T, whose 5ESS central office switch competes with Northern Telecom's switches, said last week that it has been discussing the possibility of linking IBM computers to its switches for some time.

WHAT DO THE FOLLOWING COMPANIES HAVE IN COMMON?

digital

FileNet

WANG

All three have chosen to make significant NEW product announcements at IDC/Avante's Image System conference! Why? Simply because this is the first conference exclusively designed for the prospective user of image system technology.

For more information on:

IMAGE SYSTEMS: BEYOND THE OBVIOUS
January 16-18, 1990
Phoenix, AZ

Call 1-800-525-5456 x-789

Sponsored by IDC/Avante Technologies, Inc., a joint venture
5 Speen Street, Framingham, MA 01701

General DataComm to sell SONET switch

continued from page 4

several years ago with its #1-ISS combined circuit/packet switch.

"In essence, we're combining elements of [time-division multiplexer] switching with cell relay and frame relay techniques within the architecture of the [Megamux] product," said Jon Reeves, product line manager for packet products at the firm.

The company was short on specifics regarding exactly how it would accomplish that feat, saying last week's announcement was a statement of direction, not a formal product announcement. A more detailed announcement is at least six months away, said Dan Young, General DataComm's vice-president of marketing.

But Young said the underlying bus technology is in place today to support cell relay switching because the Megamux is already based on an asynchronous transfer mode bus, not a time slot interchange (TSI) bus like most TDMs.

With a TSI bus, a fixed amount of bandwidth is defined between source and destination cards connected to the bus. The Megamux's asynchronous transfer mode bus allows that bandwidth to be allocated as required by the application.

General DataComm now plans to build upon this architecture to support much greater bandwidths.

"We have defined a new method of bus communications between TPP modules that dramatically increases the throughput of the Megamux," Reeves said, although he declined to detail what that method is.

Support for the new capability would only require upgrades to users' existing Megamux switches, not a wholesale change of equipment, Young said. The enhanced switch would support speeds above T-3 and "on the order of hundreds of megabits per second," Reeves said. "It goes somewhat further than the Netrix approach in that we allow much higher bit rate bandwidth than their architecture would give you."

Rosemary Cochran, a principal at Vertical Systems Group, a Dedham, Mass., consulting firm, questioned whether General DataComm will be able to make such upgrades to the Megamux TMS.

"The TMS is limited in terms of throughput capacity and the architecture of the machine," Cochran said. "I'm not sure what they'll do with it if they're talking about T-3 switching."

To support high-speed switching requirements in the near term, General DataComm will resell Alcatel's SONET switches as the Megamux TMS/S family.

That family includes the TM-50 Terminal Multiplexer, which is used to concentrate up to 28 T-1s on a single 51.84M bit/sec SONET Optical Carrier-1 (OC-1) link in a point-to-point configuration or as a feeder to larger TMS/S multiplexers. The ADM-50 Add-Drop Multiplexer is also an OC-1 switch but has an add/drop capability, which means users can add or drop T-1 channels at intermediary points between two ADM-50 switches.

The line also includes the FTS-150, which supports the OC-3 rate of 155.52M bit/sec and can be configured as either a point-to-point or an add/drop switch. The same is true for the FTS-600, which supports the OC-12 rate of 622.08M bit/sec. Both FTS switches can support a backup fiber link for redundancy.

General DataComm said it has demonstrated the switches for prospective customers but had not secured an order as of last week.

All of the SONET switches are available now from General DataComm. Prices range from $10,000 for an entry-level TM-50 configuration to $80,000 for a fully configured FTS-600. ◻

Police arrest teens for wreaking havoc

continued from page 6

mine if there was a problem with the system, but no glitches were found.

Greenwood suspected the system was being tampered with by intruders after clients complained of receiving tasteless greetings when calling employee voice mailboxes. Bomb threats were also left on employees' mailboxes on several occasions.

"We had to shut the whole thing down because we couldn't have people calling into the system and being subjected to vulgar comments," Greenwood said. "This prank was costing us in lost advertising, lost information and lost productivity."

IDG officials estimated that the incident cost the company $2.4 million.

When it became apparent that the intruders weren't using a local line, Greenwood had AT&T place taps on the 800 number access lines.

The hackers continued to change the greetings on all employees' phones — greetings that escalated from tasteless to obscene — and erase messages and ad insertion orders left by advertisers on the phone mail system.

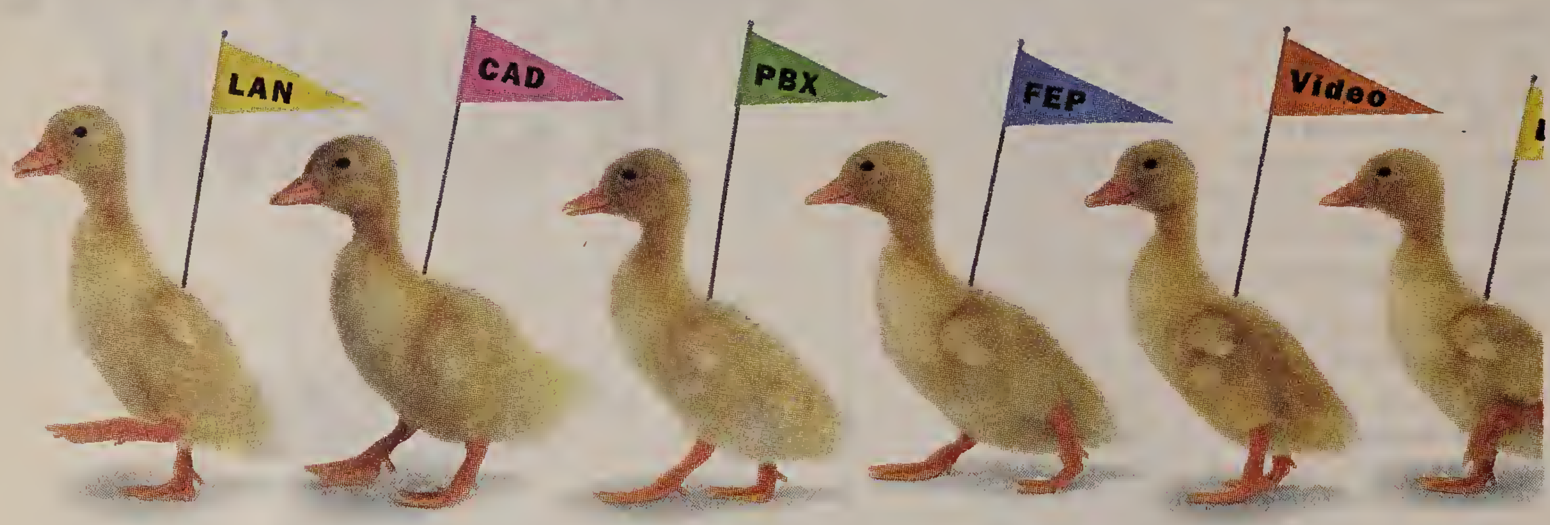
The hackers were finally caught by matching their telephone number with the exact times the Rolm Co. system recorded unauthorized access.

Delaney said this incident is the 20th of its kind he has handled since his department implemented a computer and telecommunications fraud unit eight months ago.

Greenwood said systems managers must stress to users that they take full advantage of all available security features. Many users at IDG, for instance, chose passwords that were easy to crack.

"The security is there, but the user has to do his part to safeguard the system from fraud," she said. ◻

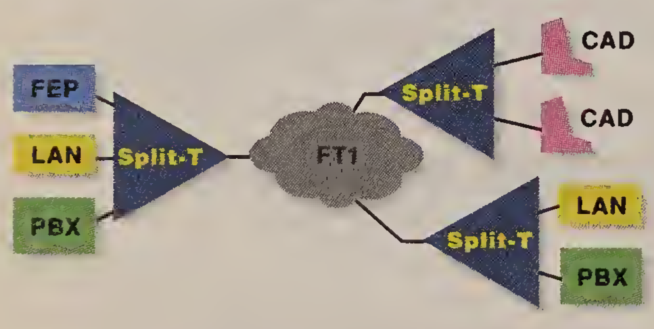
Get Your Ducks In Line



The Split-T Multi-Port DSU

Intelligent Access for T1 and FT1

It takes intelligence to make the most of today's T1 and Fractional T1 networks. **Split-T** gives you micro-DACS control of DS0 bundling, so you can use any T1 or FT1 service. And with multiple ports plus T1 drop-and-insert, **Split-T** integrates such high-speed DTE as LAN bridges, CAD/CAM systems, T1 PBXs, and channel banks.



Remote Diagnostics, Downloading

Split-T features an intelligent T1 CSU and sophisticated supervisory software. Local or remote configuration and diagnostics are easy to perform. In-service performance monitoring helps you identify and even anticipate problems. And because its software is downloadable, **Split-T** adapts to changes that make other products obsolete.

Larse Knows Network Access

Larse has been producing advanced network access equipment for years. With **TNDS**, we set the standard for intelligent CSUs. We have the products, service, and support to get your ducks in line . . . and keep them there.

Let **Split-T** help you make the most of today's network opportunities. Call us today at (408) 988-6600.

LARSE

AN AXEL JOHNSON INC. COMPANY

Larse Corporation • 4600 Patrick Henry Drive • P.O. Box 58138 • Santa Clara, CA 95052-8138

See The FAXNeT Form on Page 55

Politics, technology woes hinder EIS

continued from page 1

seminar on EIS here last week.

"Decision Support and Executive Information Systems: A Managerial Perspective" was sponsored by Decision Support Technology, Inc., a member of Softbridge, Inc., a Cambridge consultancy.

"Executives are generally disappointed by [EIS]," said Frank Morelli, associate director of marketing and management decision systems at Colgate-Palmolive Co. (Delaware) in New York. "They're marketed with a lot of hype, but no one ever mentions the technical and organizational foundation that needs to be in place."

The systems, usually mainframe-based, are expensive to build and maintain. It takes an initial investment of at least $500,000 to $1 million to get an EIS up and running. Most also require a staff of three to eight IS professionals.

Despite heavy capital outlays, half of the EISs implemented by Fortune 500 companies fail to work as promised and are not being used, claimed John Rockart, director of the Center for Information Systems Research at the Massachusetts Institute of Technology's Sloan School of Management, also in Cambridge.

Most systems fail because the chief executive officer isn't committed to the project or willing to devote many hours over an extended period of time to modify the system to meet his or her needs. In addition, users and consultants said systems that are cumbersome to use are quickly abandoned by executives.

Unlike other forms of IS, EIS must be customized to meet the information and communications needs of top executives. This is difficult to do because top executives often don't know exactly what information they need or want, or their information needs change as the business conditions or strategic objectives change.

David Ness, senior research fellow at Decision Support Technology and a speaker at the seminar, said IS managers shouldn't expect to develop the perfect EIS the first time around. He said IS executives should gradually refine the system in a process he calls "fast prototyping." This involves building EIS prototypes in rapid succession based on executive feedback.

"The idea is to abandon bad ideas quickly and build on good ones before you invest too much time and money going down the wrong path," Ness said.

The EIS team at E.I. du Pont de Nemours & Co., in Wilmington, Del., spent a considerable amount of time with top executives trying to determine the information needed to make critical decisions, according to Thomas Holmes, director of architecture and planning for IS at the chemical firm.

The group got a commitment from Edgar Woolard, du Pont chairman and CEO, to spend two hours a month discussing the system and possible enhancements. With Woolard's support, du Pont's EIS team built a working prototype in five months. The final system, dubbed Du Pont EIS (DEIS), now pulls data from four different du Pont data centers around the world daily and supports 400 executives.

A successful EIS also requires acceptance by mid-level managers. Unfortunately, many mid-level managers assume that CEOs will use EIS to look over their shoulders. Many have been known to undermine EIS so that executives stop using them, MIT's Rockart said. Managers want to retain the autonomy to fix mistakes or present plans to reverse conspicuous downward trends in profits before the CEO finds out about them.

IS managers need a strategy for ameliorating managers' fears as well as for ensuring cooperation in providing data needed to support the EIS, Rockart said.

Du Pont, for example, formed an interorganizational team composed of managers from planning, human resources, finance and other areas to guide the implementation of DEIS. Also, Woolard told panicky managers that he did not plan to use DEIS to look over their shoulders and decided to expand the project so those managers could use DEIS as well.

NETWORK WORLD
▲▲▲
161 Worcester Road
Framingham, Mass. 01701-9172
(508) 875-6400

Second-class postage paid at Framingham, Mass., and additional mailing offices. *Network World* (USPS 735-730) is published weekly, except for a single combined issue for the last week in December and the first week in January by Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

To apply for a free subscription, complete and sign the qualification card in this issue or write *Network World* at the address below. No subscriptions accepted without complete identification of subscriber's name, job function, company or organization. Based on information supplied, the publisher reserves the right to reject non-qualified requests. Subscriptions: 1-508-820-7444.

Non-qualified subscribers: $3.00 a copy; U.S. — $95 a year; Canada, Central & South America — $110 a year; Europe — $165 a year, all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin. Please include mailing label appearing on front cover of the publication.

Network World can be purchased on 35mm microfilm through University Microfilm Int., Periodical Entry Dept., 300 Zebb Road, Ann Arbor, Mich. 48106.

Network World is distributed free of charge in the U.S. and Canada only to qualified management or professionals who specify and maintain communications equipment and systems, including voice, data and video, as well as to common carriers, consultants, systems houses and manufacturers of communications equipment.

PHOTOCOPY RIGHTS: Permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by Network World, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus 50 cents per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, Mass. 01970.

POSTMASTER: Send Change of Address to *Network World*, 161 Worcester Road, Framingham, Mass. 01701-9172.

Copyright 1989 by Network World, Inc. All rights reserved. Reproduction of material appearing in *Network World* is forbidden without written permission.

The Audit Bureau

Reprints (minimum 500 copies) and permission to reprint may be purchased from Donna Kirkey, Network World, Inc., 161 Worcester Road, Framingham, Mass. 01701-9172.

We're not talking anatomy. We're talking connectivity— state-of-the-art high speed fiber optic backbone. The kind that transports the different voice and data interfaces found in today's premise environments.

PREMNET 5000

A 100 Mbps fiber optic backbone providing universal connectivity.

And moves it at the speed of light, with maximum intelligence, full redundancy, and a minimum of wires and cables.

We're talking PremNet™ 5000.

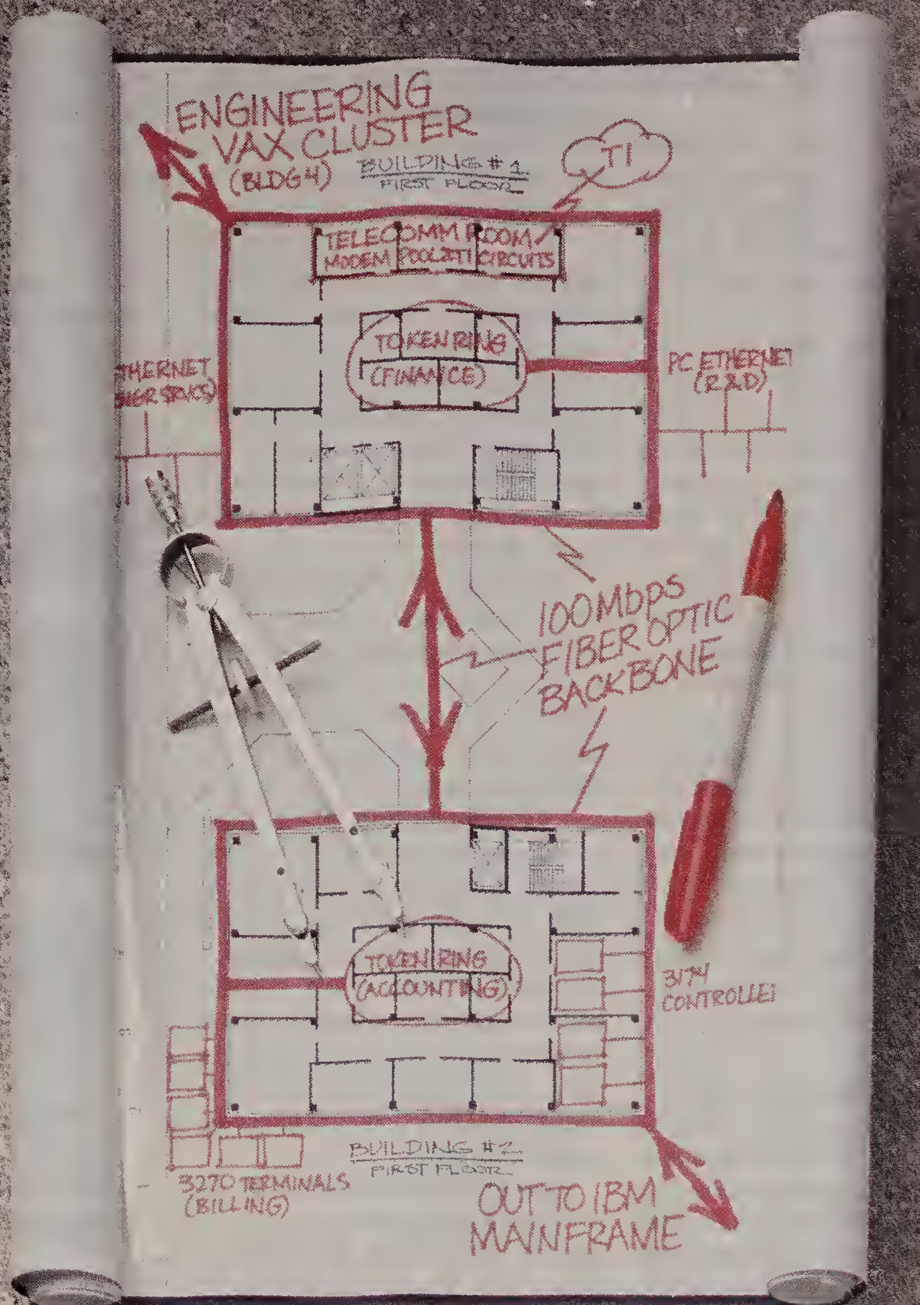
PremNet 5000 is a 100 Mbps "superhighway" that provides universal connectivity from one local area network to the next, from one building to another and, most importantly perhaps, from the present to the future.

It accomplishes this feat through the use of fully redundant multi-interface nodes that can accommodate point-to-point, ring and star configurations. A single node can provide support for Ethernet and 4 and 16 Mbps Token Ring LANs. Nodes also support IBM 3270, T1, EI, RS-232, V.35, Voice and more.

PremNet 5000 is the first system of its kind to use microprocessor-based interface cards that provide controlled bandwidth allocation as well as access to status, test and configuration information for enhanced network management. What's more, PremNet 5000 has an on-board network management system or can be controlled through Racal-Milgo's CMS400, a PC-based network management system.

Best of all, PremNet 5000 comes from a global company with $3 billion in revenues and a unique ability to interconnect local and wide area networks. As a worldwide service and installation organization, Racal not only provides hardware, but system design, installation and project management. (In other words, it's a turnkey job.)

It doesn't take a lot of courage to establish universal connectivity within your organization. Just a lot of backbone. PremNet 5000 is the premise distribution solution you've been looking for. Phone 1-800-328-2668 today.



YOU'VE GOT TO HAVE A LOT OF BACKBONE TO PULL THIS ONE OFF.

RACAL WE UNDERSTAND NETWORKING INSIDE AND OUT.
Racal-Quanta®

See The FAXNeT Form on Page 55

©1990 Racal Data Communications, Inc. All rights reserved.

Sharing insights into groupware

continued from page 1

improving employee productivity. But they all encountered unforeseen bumps along the road to implementation.

MCI Telecommunications Corp. began installing Lotus Notes in July to support communications between 300 LAN users tied to an Ethernet backbone.

The enhanced productivity promised by Notes helped MCI cost-justify LAN connectivity for its formerly stand-alone personal computers. "We wanted to increase productivity and communications between people in the organization," explained Brian Plackis, a LAN manager for the company in Richardson, Texas. "We wanted enterprisewide applications that would make the net pay for itself."

MCI uses Notes' so-called many-to-many electronic mail capability, which enables users to broadcast messages and access responses from multiple users, Plackis said.

In addition, MCI tailored Notes' data base for use by its LAN help desk to eliminate an inefficient, paper-based method of recording and responding to end-user problems. "We took their status-tracking data base and totally redesigned it for a trouble-ticket entry system," Plackis said. Details about problems and the users who reported them are now available on-line.

But Plackis acknowledged that the installation of Notes did not come off without a hitch. One difficulty was implementing the product's security features. "You really need operating system expertise" to assign access rights and certify users, Plackis said. "It's like another operating system."

MCI's LAN operating system, Banyan Systems, Inc.'s VINES, posed another problem because Notes is not currently certified to run on VINES. To use Notes with VINES, MCI had to install Network Basic I/O System drivers on all network interfaces. NETBIOS is the Notes transport protocol.

"[Before,] Lotus didn't feel they had to support VINES," Plackis said. "But if you look at large corporate customers, Banyan owns that market. Those are the companies that are complex and sophisticated enough to really appreciate the power of an application like Notes."

Plackis said users also need to be aware of hardware and memory requirements for Notes. As a Microsoft Corp. Windows 3.0 application, the software requires at least an Intel Corp. 80286-based personal computer with 2M bytes of random-access memory that can be upgraded to 4M bytes.

MCI had roughly 40 outdated personal computers that needed to be replaced with Personal System/2s. "About a third of our hardware was compliant," he said, adding that it cost about $250,000 to upgrade personal computers and add memory to others.

Although Notes has improved user productivity, Plackis said it does have shortcomings. "I'm more excited about the concept of Notes than the product itself," he said. One such shortcoming is an inability to join files from different data bases.

The first and largest Notes user is Price Waterhouse, which currently has more than 2,500 people using Notes and plans to increase that number to 10,000 within the next year. Currently, 39 U.S. and international offices are supported, and that number will eventually grow to 200.

"We're using it for a corporate knowledge base in which we can coordinate activities of professionals around the world and share their expertise," said Sheldon Laube, national director of information and technology at Price Waterhouse in New York.

More than 100 Notes-based applications are currently being developed by end users, Laube said. He attributed that to the simplicity of building Notes applications, which he likened to the process of writing Lotus 1-2-3 macro commands. "People love it. It's just driving the world here," he said.

One difficulty experienced by Price Waterhouse in implementing Notes was setting up dedicated OS/2 servers to support the product, largely because the company had no previous experience working with OS/2.

"We were not an OS/2 shop, so we underestimated the complexity of getting servers up in each office," Laube said. In response to these difficulties, Price Waterhouse now sends servers with preconfigured hardware and software to each site, relieving users of the need to install OS/2, requesters and device drivers to support Notes.

One of the earliest pilot users of AT&T's Rhapsody is Ogilvy & Mather, a New York-based advertising firm. The company has 12 Rhapsody users on an Ethernet LAN who communicate with remote users at AT&T, its advertising client. Ogilvy & Mather will use Rhapsody as a means of keeping clients updated on the status of an advertising campaign, according to Louise Vondran, chief information officer. "We will customize the information flow for a particular client," Vondran said.

Based on the first month of the firm's pilot, Vondran said the greatest challenge has been restricting the pilot to its original application, rather than expanding it to take advantage of other applications. By doing this, users will be able to effectively measure the results of the pilot and the benefits of Rhapsody, she said.

One goal of the pilot, Vondran said, is to discover any shortcomings in the first version of Rhapsody.

Intel chipset to support video

continued from page 4

"I think the future is very strong for multimedia networking," said Tim Bajarin, executive vice-president with Creative Strategies International, Inc., a consultancy in Santa Clara, Calif.

Bajarin said the Intel announcement is significant because it represents the first major commitment by a leading chip maker to produce cost-effective multimedia chip technology.

Among the companies that plan to offer net products based on the Intel technology is ProtoComm Corp., a start-up in Trevose, Pa., that reported revenues of about $1.5 million last year.

According to Emilie Lengel, a vice-president with the company, ProtoComm plans to begin shipping a new personal computer add-on board based on the Intel technology in the first quarter of next year. The product, which will be targeted at Novell, Inc. NetWare LAN users and initially based on Intel's older A series chipset, will enable personal computers to compress and decompress video traffic for transmission over LANs or T-1 links at a rate of 1.5M bit/sec.

In addition to the board, users must load ProtoComm software onto their LAN server. The software, a NetWare Network Loadable Module, will basically ensure that other data on the LANs does not interfere with video signals.

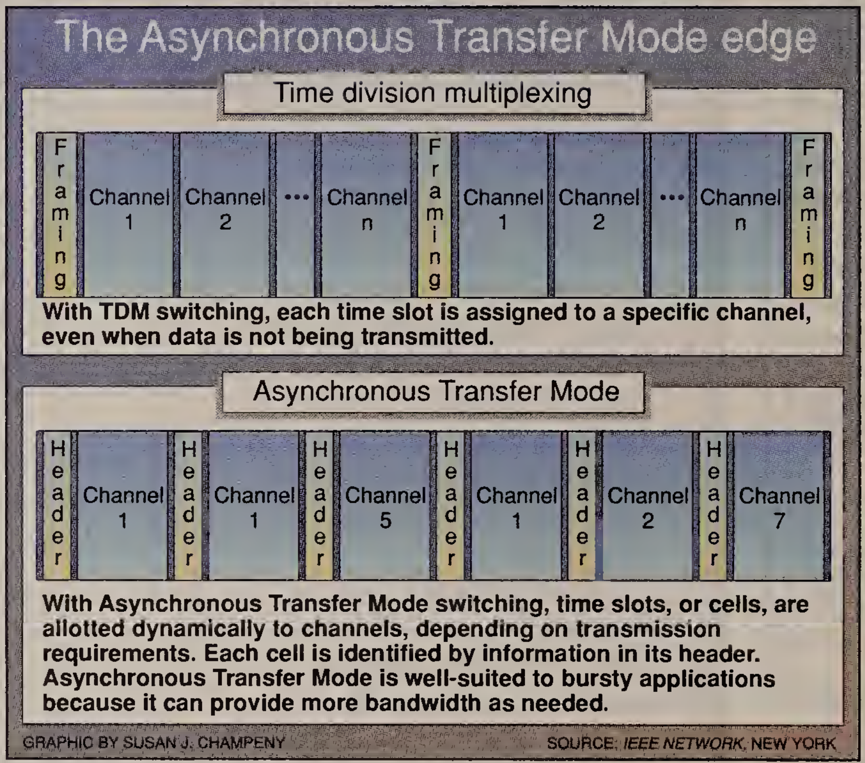
BBN reveals plans for cell relay

continued from page 1

support for cell relay but have not detailed how they will embrace the technology.

"The next-generation switches are starting to arrive," said Nick Lippis, a principal at Northeast Consulting Resources, Inc. in Boston. "We're seeing a departure from rigid T-1 muxes, with static bandwidth between end points, toward a more flexible allocation of bandwidth."

Lippis, who has been briefed on BBN Communications' plans, said he was most impressed with the price of the cell relay switch.



The Asynchronous Transfer Mode edge

Time division multiplexing
Framing
Channel 1
Channel 2
•••
Channel n
Framing
Channel 1
Channel 2
•••
Channel n
Framing
With TDM switching, each time slot is assigned to a specific channel, even when data is not being transmitted.
Asynchronous Transfer Mode
Header
Channel 1
Header
Channel 1
Header
Channel 5
Header
Channel 1
Header
Channel 2
Header
Channel 7
With Asynchronous Transfer Mode switching, time slots, or cells, are allotted dynamically to channels, depending on transmission requirements. Each cell is identified by information in its header. Asynchronous Transfer Mode is well-suited to bursty applications because it can provide more bandwidth as needed.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: *IEEE NETWORK*, NEW YORK

"They were talking about $10,000 or so for four to eight ports with a DS3 trunk," he said.

BBN Communications' new T/300 is somewhat similar in design to the high-speed cell switch under development because it uses a multiprocessor architecture that improves reliability and lets users increase power incrementally, said Mark Lunardoni, the company's product line manager for switching products.

User impressed

Rob Sim, a systems designer with Racal-Milgo, Ltd. in Hook, England, and a beta user of the T/300, said, "It is probably the most impressive packet switch we've come across." Racal-Milgo is acting as a systems integrator for London's National Westminster Bank PLC and has been testing the T/300 since August.

The switch is fully compatible with previous BBN Communications packet switches, he said. But according to his tests, it offers nearly five times the performance of the C/300.

The T/300 uses a bus but is scalable to the extent that users can add processing power as requirements increase. That's accomplished using the T/300's Serial I/O Processor (SIP) modules, which are based on a Motorola, Inc. 68020 chip.

Only one SIP is required, but users can increase the capacity and performance of the switch by adding up to four more SIPs.

The SIPs function independently of one another, which means no single processor failure can take down the entire switch.

That safeguard fits in with the way BBN Communications packet-switching networks are designed, using many distributed switches as opposed to a few large nodal switches fed by smaller switches, Lunardoni said.

A System Resource Board (SRB) in the T/300 controls access from the SIPs to the network tables, node structures and data buffers stored on the SRBs. For added redundancy, users can install two of the 6M-byte SRBs.

Fourteen of the T/300's 77 ports can be configured as trunks, while the rest support host or terminal devices. Port speeds range from 9.6K bit/sec to T-1, including fractional T-1. The T/300 is available now, with pricing starting at $45,000.

In the third quarter of next year, BBN Communications plans to add a frame relay interface to the T/300. That interface will make the switch compatible with emerging frame relay services from carriers and will reduce the number of connections required between the T/300 and a backbone switch, such as a T-1 multiplexer, to reach multiple remote sites.

It will also improve throughput by stripping away some of the protocol processing overhead of X.25.

The company plans to manage the switch using Digital Equipment Corp.'s DEC Management Control Center Director, which it will license from DEC.

For its cell-switching packet switch scheduled to debut in 1992, BBN Communications plans to use a design based on that of the TC/2000 parallel computer, according to Jeffrey Palmer, vice-president of planning and marketing at the company. That machine contains no system bus. Instead, its multiple processor cards are linked via an internal packet switch.

As additional processor cards are added, the internal packet switch is enlarged, a technique known as butterfly switching. That makes the machine scalable to suit small to large processing requirements.

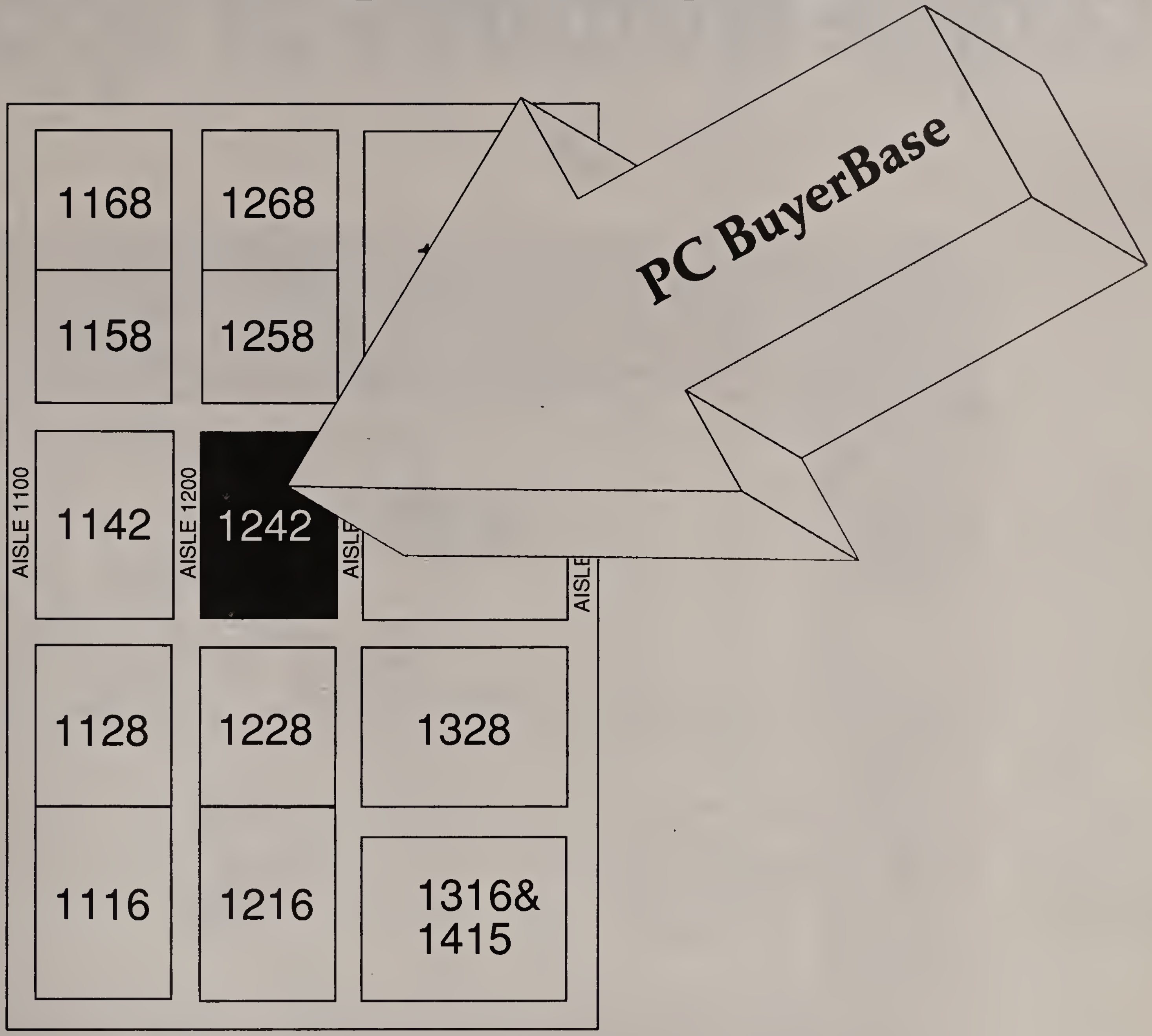
"Contrast that with a bus-type architecture, where you're always constrained by the bus in terms of scalability and resiliency from failure," Lunardoni said.

"The butterfly switch is unique within BBN. It's BBN's homegrown technology," Palmer said. "It's been a great vehicle to learn about high-performance packet switching. Now let's apply it to a switch, not to the backplane of a computer."

By doing that, the firm hopes to come up with a cell switch that will be scalable from T-1 to gigabit speeds, Palmer said. "That's the range of performance people are going to be operating in."

Lunardoni said BBN Communications will likely use something along the lines of the SIP cards in its T/300 packet switch as the processor boards for its high-speed cell switch. Those boards will then connect to some type of internal, high-speed switching matrix.

Come See
"The One-Call Computer Buying Source"



Introducing InfoWorld's PC BuyerBase

It's a complete PC buying database. From A to Z. And it saves you time by providing all the information you need to make the right PC buying decisions. Each time you call PC BuyerBase, a Product Information Specialist will access the database for you and provide the solutions to your buying strategy. And to top it off, we'll send hard copy of the information you requested via fax, overnight delivery or US Mail. No other service brings computer buying information together like InfoWorld's PC BuyerBase.

When You Call PC BuyerBase You Get:

- Complete product information with detailed technical specifications.
- InfoWorld's product comparisons, full text reviews and report cards plus product abstracts from PC Magazine, PC WEEK, Byte, MacWEEK, Macworld, and more.
- Complete pricing information including:
  - —National and city averages.
  - —Manufacturer's list price.
- Dealer locations by city.
- New product updates.

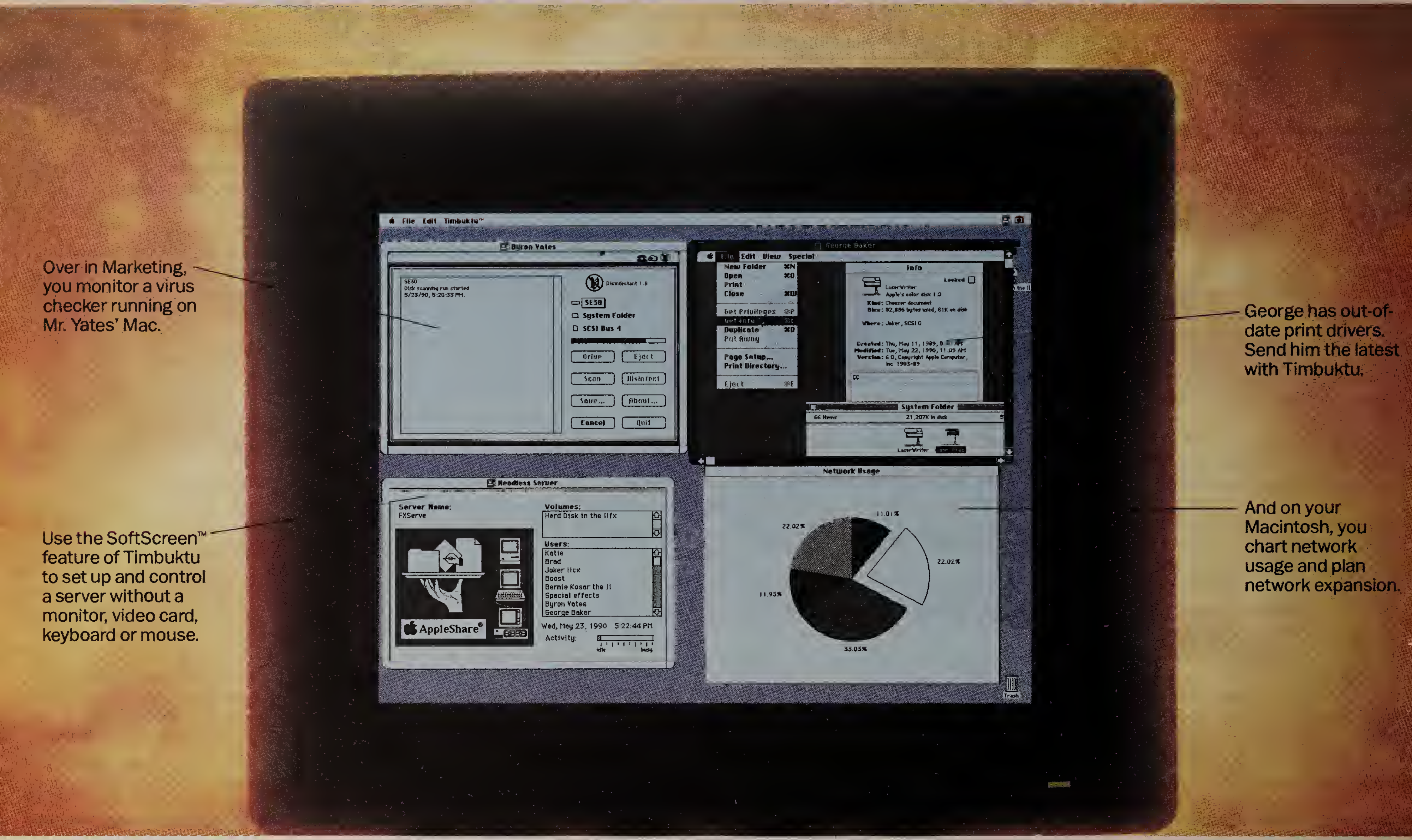
Visit Booth #1242 and see how PC BuyerBase can work for you. Our interactive display terminals will allow you to actually use the service while you're at the show.

And if you subscribe to PC BuyerBase at the Comdex show, we'll give you an additional 15 minutes of access time.

PC BUYERBASE
INFOWORLD

"The One-Call Computer Buying Source."

New Timbuktu 3.1 gives you multiple windows of opportunity.



Over in Marketing, you monitor a virus checker running on Mr. Yates' Mac.

Use the SoftScreen™ feature of Timbuktu to set up and control a server without a monitor, video card, keyboard or mouse.

George has out-of-date print drivers. Send him the latest with Timbuktu.

And on your Macintosh, you chart network usage and plan network expansion.

Now user support is faster and easier than ever because you can help more than one person at a time. With Timbuktu® 3.1, you can observe and control multiple Macintosh computers in multiple, resizable windows. Which means you don't have to wipe out your screen to see someone else's.

Without leaving your Macintosh, you can help a user down the hall solve a printer problem in one window, monitor a server in another, while still using your own application. And each window is dynamically updated, regardless of which one is active.

Timbuktu also provides fast and efficient file transfer capabilities, because you can send any combination of files and folders directly to another user. And that means you can update software quickly and easily.

Multi-window Timbuktu. Now you have more opportunities to solve more problems with a lot less effort.*

For information on Timbuktu, the Timbuktu 30-Pack, or *The Gold Plan,* our volume purchase program, call Customer Service at (415) 596-9000. Dealers call our Reseller Hotline at 1 (800) 344-7489 in U.S. and Canada.

*One copy of Timbuktu is required for each computer.

Farallon™
The Personal Communications Company™

2000 Powell Street, Suite 600, Emeryville, CA, USA 94608 FAX: (415) 596-9020.
Timbuktu is a registered trademark, Farallon, the Farallon logo design, SoftScreen and The Personal Communications Company are trademarks of Farallon Computing, Inc. AppleShare and Macintosh are registered trademarks of Apple Computer, Inc. © 1990 Farallon Computing. All rights reserved.

See The FAXNeT Form on Page 55